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Contents

This week...



Refurbished Components

08 Refurbished Components

If you're looking for new parts for your PC, then it's good to know you can save money by buying refurbished components. But what does 'refurbished' actually mean, and are the discounts you get really as straightforward as they seem?

14 Refurbished Systems

Of course, you might not want to just buy components; you might be after a whole new system, whether that's a desktop PC, a laptop, a tablet or even a games console. We look at the advantages and disadvantages of buying a refurbished model

24 Refurb Your Own PC

What if you'd like to cling on to the stuff you already have, just for a little while longer? In that case, you could consider refurbishing your own computer, giving it a clean, a fresh OS installation and a general bit of sprucing up. We look at what's possible

30 Where To Buy Refurbished Hardware

If you've made the decision to buy refurbished products, then you need to know where to look to actually find them. With that in mind, James Hunt has been finding out what's on offer and where you can find the best deals



Refurbished Systems



Refurb Your Own PC



30 Where To Buy Refurbished Hardware



32 Refurb Tablets: Pros And Cons

32 Refurb Tablets: Pros And Cons

Mobile devices are fast becoming the primary way for people to do everyday computing tasks like accessing emails and browsing the web, but they're not without their problems. What, then, should you be looking out for?

36 YouTube Red

You might be forgiven for thinking that YouTube makes tons of money already, but apparently it doesn't make enough, and things like Adblock don't help. That's why it's launched YouTube Red, which is set to take the site's money making potential to a whole new level

42 30 Years Of Computing

It's been a full three decades since this magazine was first published (which is older than some of our current contributors), and in that time, the world of computing and technology has changed dramatically, as James Hunt explains

68 Mid-range Motherboards

Although you can pick up a motherboards for mere peanuts or even spend hundreds of pounds, there are plenty of boards in the region of £50 to £130, which will do everything you need and more. But which one's should you consider? David Hayward has been testing six to find out

88 The Writer's Tale

It's not just technology that's changed over the last 30 years; Micro Mart too has gone through many transformations. Mark Pickavance has been writing for us for a good portion of those years, and he's telling us this week what it's meant to him

Also In This Issue...

50 1985 At A Glance
David Briddock highlights some of the big events from the year of our birth

58 Code With AI2
This week, we look at creating a stock quote app

76 Download Directory
The latest selection of programs for you to download at your leisure

82 Retro Round-up
Dave Edwards returns with his monthly look at the world of retro gaming

86 What's Up With Who's Down?
Google has a new thing it wants the world to use. Will it succeed?

Group Test Mid-range Motherboards

- 68 Gigabyte Z97M-DS3H
- 69 MSI Z97M Gaming Motherboard
- 70 MSI Z170A Gaming M5
- 71 Gigabyte Z97X-SOC Force
- 72 ASRock H81M
- 73 ASRock Z97 Extreme6
- 74 Sum up

Reviews

- 60 Chillblast Fusion Drone Gaming PC
- 61 SanDisk Extreme 500 240GB Portable SSD
- 62 BenQ W1080ST+
- 63 Crucial BX200 480GB SDD
- 64 Edifier R12U active Speaker
- 65 Roccat Kova
- 66 Fallout 4

Experts

- 106 Ask Aaron
- 108 Ask Jason

Specialists

- 92 Linux Mart
- 93 Mac Mart
- 94 Mobile Mart
- 95 Hardware Mart
- 96 Gaming Mart

News

- 52 The Latest News
- 75 Letters

Regulars

- 28 Subscriptions
- 98 Ad Index
- 100 IT Essentials
- 102 Classifieds
- 112 Logging Off



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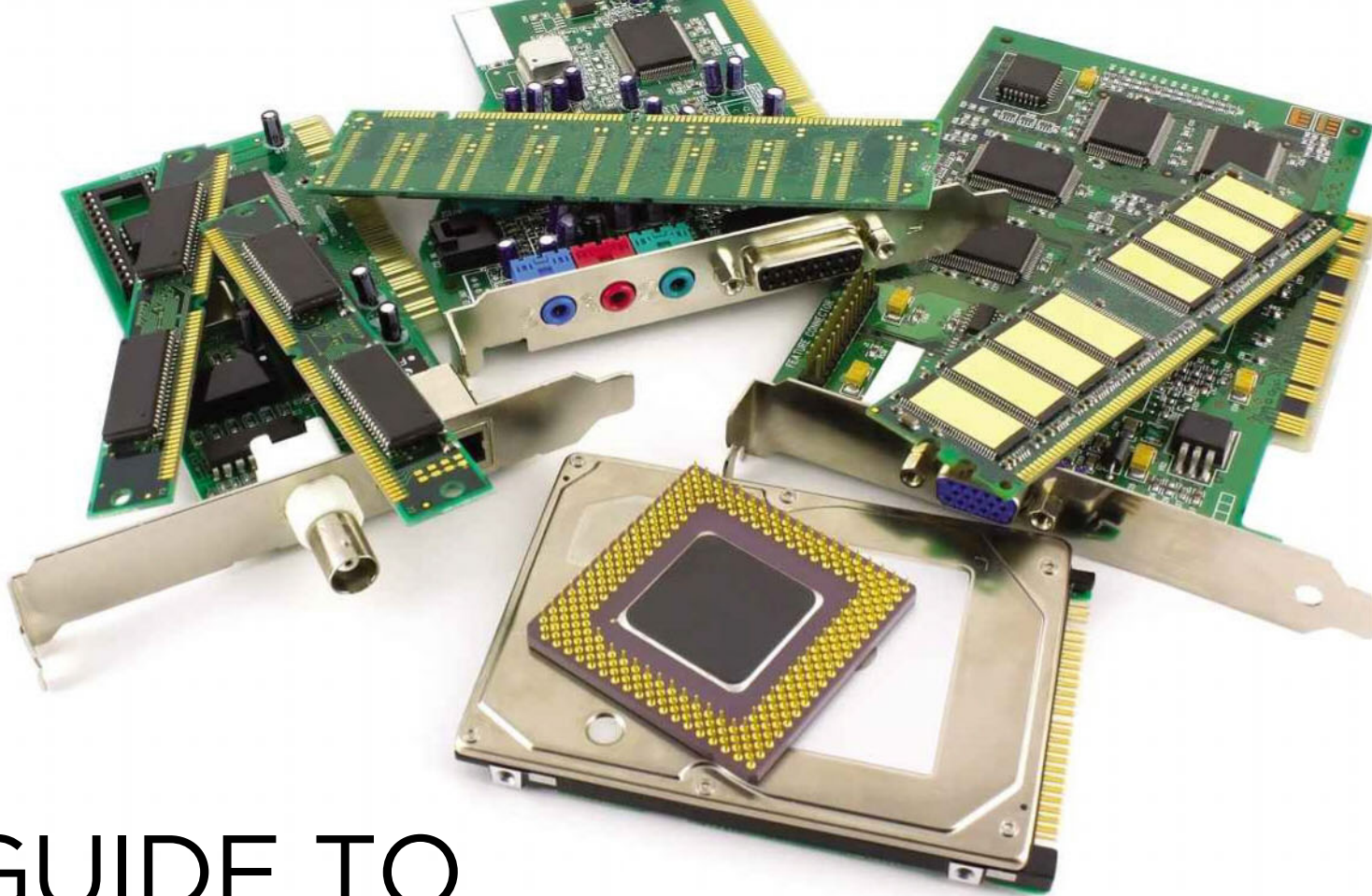
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GUIDE TO REFURBISHED COMPONENTS

Which used parts should you buy and which should you avoid?

Although refurbished systems are worth looking at when you're buying a new PC, not everyone wants to replace their entire computer when the time comes to spend a bit of money. If you're the type of person who prefers to upgrade rather than replace, it's still worth looking out for a bargain – and refurbished or other open-box components might just provide the biggest bargain of all.

But are they a false economy? In many cases, probably not, but it doesn't hurt to learn where the risks are concentrated when you're buying hardware that has been handled before, whether it's refurbished or not. That's why we've put together this guide to second-hand components and the things you have to look out for when you're buying them.

Hard Drives

When it comes to PC components, hard drives are by some distance the most likely to fail through wear and tear. Not only do they contain moving parts, but they're subject to constant use and especially vulnerable to dirt that could be introduced through normal use.

The problem for anyone trying to refurbish a hard drive is that they're not really serviceable, regardless of who you are. The extreme conditions required to repair a hard drive mean it's cheaper to buy a new one than fix a broken one. If anyone



cracks one open after it's left the factory, they need to do so in a specifically dust-free environment. This is why data recovery has a literally forensic quality. Expose a drive's inner workings in anything other than a specialist facility and you can only make it worse than it currently is.

What this means is that most hard drive refurbishments are simply drives that have been wiped and tested for bad sectors. Theoretically, it's as good as new. In practice, it'll have a much shorter lifespan than a new drive would. Bad sectors can even appear on new hard drives in a virtually spontaneous manner, and the more a hard drive has been used, the more likely they are to appear.

The upshot is that if you're buying a refurb system of any kind, we'd strongly advise looking at a new hard drive even if the existing one is fully tested and considered in full working order. If you're looking to buy a stand-alone refurb drive, we'd suggest that you simply don't. Hard drives are so cheap that there's not a lot to gain financially and a lot to lose in terms of the precious, irreplaceable data you store on them.

SSDs

Compared to hard drives, SSDs are still a very expensive way to buy storage, so refurbished SSDs can represent a significant saving. Although SSDs don't have any moving parts, which makes them less prone to the kind of failure that afflicts mechanical drives, that doesn't mean they're completely safe to buy either.

Refurbishing an SSD involves much the same process as refurbishing a mechanical drive: the storage will be wiped and

“ SSDs are still a very expensive way to buy storage, so refurbished SSDs can represent a significant saving ”

tested for errors, and the firmware may be flashed with a newer version to bring it fully up to date. It's possible you'll see the case get replaced too. But the actual storage area – in this instance, the NAND flash – is unlikely to get an overhaul, and that means the repairs that are done mostly count as cosmetic.

Like mechanical drives, a refurbished SSD won't have had the most important aspect of its hardware repaired. Dust and physical wear isn't as much of a problem with SSD drives, but flash memory does still fail after a certain number of writes and rewrites. Even though it might look indistinguishable from a fresh SSD, the wear will still be there, and it can't be reduced.

The provenance of an SSD sold as refurbished is also worth thinking about. There's very little reason to get rid of a working SSD at the moment, so those that have been refurbished will probably have been returned for being faulty in some way. Since we've established that a repair job is hard (if not impossible!) to do on an SSD, if it genuinely was faulty then there's a good chance it still is. If the retailer didn't spot the fault, make sure you do by thoroughly testing any refurbished drive you buy.

Processors

It probably won't surprise you to learn that, as with most of the components we've mentioned so far, there's no way to refurbish a modern processor. At best, any processor claiming to be refurbished will be an open-box or ex-display model, with all the risks that implies.

Unlike hard drives, open box CPUs have a good chance of being in full working order and are likely to stay that way. Since processors can't be refurbished, even by manufacturers, then if the unit is on sale it's because it has been tested and deemed to be in full working order. Even if the worst happens and it breaks



soon after you buy it, your system is unlikely to suffer any serious damage or data loss due to malfunction – something that isn't the case with hard drives.

If you buy a CPU that claims to be refurbished, the only thing you have to worry about is the returns policy of the place you're buying it from. If they allow you to return faulty items, you might as well take the gamble. If they specifically exclude open box and ex-display models from returns, it probably isn't worth the risk, purely because processors are hugely expensive even when purchased second hand. They're also not something you can do without for any length of time!

Graphics Card

The complexity of graphics cards tends to mean that refurbished examples turn up with reasonable regularity, since there's a lot that can go wrong and plenty that can be repaired as well.

The good news is that most graphics card parts can only be replaced by the manufacturer, which guarantees good-quality repairs, and those parts that can be replaced by users aren't exactly critical in the first place.

For example, only manufacturers can replace the GPU or memory chips on a graphics card, which are the components that matter the most. Users may be able to repair a graphics card's heatsink or fan, but assuming they're guaranteed to arrive in working order, this shouldn't present much of a problem. It's entirely possible that 'refurbished' means it's just been given a clean and paired up with new cables and accessories, in which case you're getting a great deal. Graphics cards have a very long lifespan, such that they don't usually wear out under normal use; it's more likely that you'll have to replace it for failing to keep up with technical demands than because it's broken.

The only thing to be careful of is open-box graphics cards, which haven't been repaired or refurbished. There's a strong possibility – especially at the high end of the market – that an open box graphics card was overclocked but couldn't handle higher speeds and was returned for that reason.

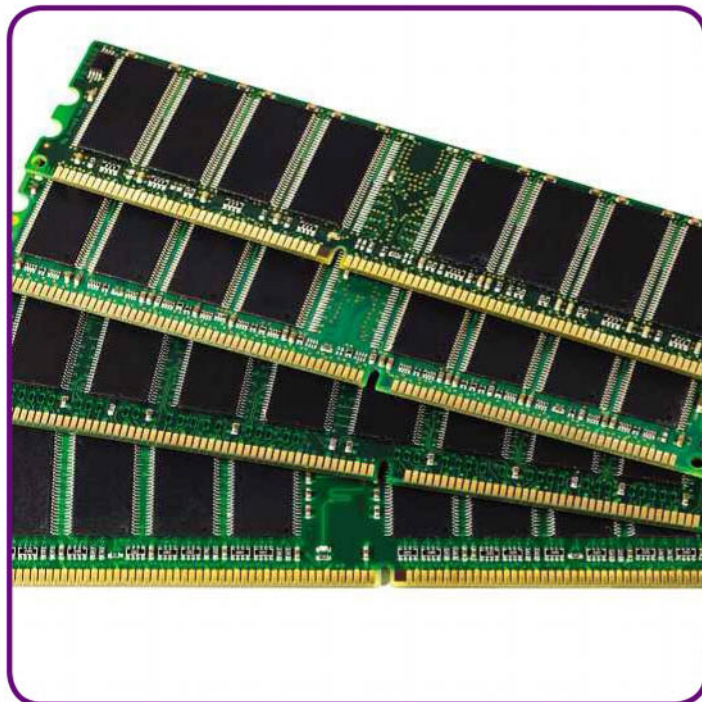
Overclocking a card even for a short amount of time can introduce minor flaws that cause the card to fail much earlier than if it has been run normally, but there's no way to tell whether you're buying a card which has been thrashed to within an inch of failure or returned unused. Open-box graphics cards should be treated with far more caution than any claiming to be refurbished simply because of the culture surrounding them.

There's at least one good thing about refurbished graphics cards, though, and that's how inessential a graphics card is to the normal operation of any system at the moment. If you're running a recent Intel or AMD CPU, there's a strong chance it has an on-board GPU, which you could use temporarily should your graphics card fail. This makes the risk slightly easier to swallow: if the card fails, you'll still have immediate access to your system while you claim your refund.

RAM

Memory is almost unique in being both incredibly cheap but critical to a PC's operation. A bad stick of RAM can cause problems and instability that might look like the result of a fault in literally any component of your system. Even if you could buy refurbished RAM, it would scarcely be worth saving the money to do so.

As it happens, you can't buy refurbished RAM, purely because no one's actually selling it. At best, you may find open-box RAM, but even then it's probably not going to offer



a considerable saving. Anything more than £5 off retail would be excessively low.

If you're looking into buying old or specialist RAM, 'refurbished' might mean that it's been recovered from an old system, cleaned up and then tested for integrity. In any case, you're dealing with the same issues you'll face with other items that can't be manufacturer refurbished: essentially, it's just second-hand hardware. Check for a returns policy, and for RAM specifically, run it through some rigorous testing when you get it. Don't just check it for data integrity either: do a stress test. If there are any serious flaws, they should become evident as soon as you get the heat pumping into it, and it's better to realise sooner rather than later.

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Monitors

Most components require you to exercise a large degree of caution if you spot a refurbished example. For monitors, the opposite is true: as soon as you know roughly what model you want, you should do everything you can to actively seek out a discounted, refurbished model.



“ Refurb monitors aren’t any more likely to break than completely new ones ”



The reason for this is that monitors are one of the most frequently returned pieces of hardware on the market. Many of the returns will simply be because the buyer didn’t like the look of the screen, but refurbished ones are normally returned because they have a couple of stuck or dead pixels.

In case you’re not sure what that means, stuck pixels are those which remain a single colour rather than changing with the on-screen picture, while dead pixels are pixels that don’t light up at all, appearing as black dots. Most LCD screens have at least one or two stuck or dead pixels, purely because weeding them all out would financially cripple manufacturers through discarded screens. Retailers, however, may have a less rigid policy. If a buyer doesn’t like the stuck or dead pixels, the retailer might take a return just to keep them happy. Assuming you can live with the odd intrusive pixel, the money you save makes open-box monitors worth buying.

But better-still are the genuine, manufacturer-refurbished monitors. Only if the number of stuck or dead pixels exceeds a certain amount or if the pixels are in the main area of the panel (i.e. the middle) will screens be sent back for manufacturer refurbishment, and when that happens they’re essentially replacing the whole screen with a new one. A fresh LCD panel will be swapped into the existing shell, free from stuck pixels and ready for action.

Thankfully, refurb monitors aren’t any more likely to break than completely new ones. At worst, you’ll have an annoying pixel or two to contend with, but for the amount of money you save, you can just use that pixel as a way to remember how much fatter your wallet is as a result.

Motherboards

Again, motherboards wear out so rarely that even a refurbished board shouldn’t have much trouble surviving well beyond the point where you need it to keep working. Most people replace their motherboards because they’re upgrading the CPU to one that demands a new socket, and they’d happily chug along for a lot more time than we ask them to.

In terms of what can actually be replaced in a motherboard, there isn’t a whole lot. Fans and heatsinks can be cleaned and/or replaced, the CMOS battery can be switched out for a new one, and after that point the motherboard will virtually be as good as new, save for a sprinkling of dust in the hardest-to-reach areas.

If a board has been professionally or manufacturer refurbished, then it’s possible that certain electronic components – maybe capacitors or resistors – might also have been replaced, but these are so minor that it’s unlikely to be indicative of any wider fault. As long as the testing has been thorough and there’s some kind of returns policy in place, there’s very little reason to worry about a refurbished motherboard’s performance.

If you buy a motherboard that’s refurbished or open box, the only thing you really have to worry about are the accessories. Motherboards come with a lot of parts, some of which you need, some of which you don’t. If the second-hand board you’re looking at doesn’t have all of its parts with it, make sure you know what else to buy. It may be as important as a backplate, which you can’t really do without, or it may be as minor as a SATA cable that you already have spares of anyway.

Ultimately, the chance of receiving a dead refurbished motherboard isn’t much greater than the chance of receiving one new, so if you spot the one you want at a substantially reduced price, we think it’s worth the risk. **mm**

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Even if you haven't used a Rapoo product before, there's a chance you've used a Rapoo product. That's not as odd as it sounds: the origins of the firm date back to 2002, when it quickly established itself in China as a manufacturer of products such as keyboards and mice.

It's worked with brands such as Logitech and Trust over the years, from its state-of-the-art production facilities (the factory, for instance, recycles all its water, uses solar panels on its roof and, crucially, treats its workers well, with a strong staff retention rate).

Since then, it's introduced its own range of input/output devices, building on the extensive research and development it does in-house.

The firm actually splits its business into four areas. There's its VPro range of gaming peripherals, the manufacture of drones under the Xiro brand, and then there's the well-regarded keyboard

and mouse line. On top of that, Rapoo also invests heavily in robotics. It's deployed robotics in its factory for even greater accuracy and reliability, and it now also sells that technology to other firms.

It's rare to see a company such as this. Speaking with Ben Jones, Senior Product Manager at Hama UK, Rapoo's UK distributor, he told us that nothing is outsourced. Rapoo has its own R&D, support, manufacturing and sales arms. The upshot of that is that the firm's returns rate for products is microscopic, and even then the majority of those returns are tested and found to be fine.

To give an example of the features of just one product, Ben told us about Rapoo's 8900P keyboard.

"It has proximity-sensing multimedia buttons at the top," he said. "They're contactless, tactile feedback vibration, to give you the sense that you're touched a button."

Furthermore, Rapoo uses 5GHz transmission for its wireless products, including on the 8900P. "It's a wide frequency, but low range," Ben explained. "As such, battery life is extended from three months for a 2.4GHz frequency product, to nine, 12 or 18 months here, depending on the product."

On top of that, Rapoo has been the recipient of many design awards for the aesthetics of its products.

The Rapoo product line, which is available in the UK, is fully supported. The UK distribution team at Hama UK is the first line of support, and then there's a dedicated office in Rotterdam where problems can be escalated too. There's always the main HQ in China too.

The main thing here is that Rapoo takes support seriously. It has confidence in its products and backs them accordingly. Not surprising, given the more than a decade's worth of expertise it's built up....



Rapoo's motivated staff are key to its success



BUYING REFURBISHED SYSTEMS

What to look for and where to look for it...

If you've never bought a refurbished device before, you might wonder what you should expect. Clearly the process of buying a pre-owned device isn't identical to buying a fresh one, even if it's been professionally restored, but how different is it?

To try to help you understand just how simple refurbished hardware can be, we've taken a look at the different types of systems you might choose to buy refurbished and what things you should look for when you're trying to pick one. Follow our advice and you can

be certain that whatever you decide to buy, you'll end up with exactly what you wanted.

Refurbished Desktops

Refurbished desktops can vary hugely in quality and construction. Desktop systems are the easiest to build and modify, so if you buy a refurbished system, you have no clear way of knowing how extensive – or not – the modifications are. If you buy from a manufacturer or retailer, you should have a fairly good idea of its provenance, but second-hand or third-party sales are much more of a grey area.

The good news is that refurbished desktop systems are normally incredibly cheap, and their flexibility makes them the easiest to improve and modify yourself. It's unlikely that you'll find a desktop system refurbished to the specifications you were looking for, but at the same time it's very easy to take a refurbished system that's close and make the improvements you'd like to have seen – something that's virtually impossible to do with laptops, tablets and games consoles.

As with all refurbished hardware, desktop systems

are tested before they go on sale, but with so much about a system that might go wrong, it's hard to be clear what the original problem was and whether it was actually fixed – if, indeed, there was a problem at all. There's only so much that can be done, and if the problem was a very rare one, it may not have been replicable (and therefore fixed) by the person selling it at all.

If you buy an open-box system, it's possible that the only reason it's being sold as refurbished is that the buyer customised it then didn't want it. Rather than dismantle the

“ Refurbished desktops are far more trustworthy than a normal second-hand desktop that you might find on eBay ”

hardware completely, retailers and manufacturers would rather discount the system, remove anything with enough second-hand resale value, and recover the cost by selling it as refurbished.

Whether you buy from a manufacturer or a retailer, refurbished desktops are far more trustworthy than a normal second-hand desktop that you might find on eBay or some other third-party sales venue. The main thing you can expect is some level of aftersales support, which you won't be entitled to if you buy person-to-person.

The down side of this is that when you buy a refurbished desktop, they're going to lose most of their already-discounted value. Don't buy a desktop system if your plan is to make an investment or flip it for profit. Only buy a desktop system over any other if you're planning to make use of its extra power and customisability

(e.g. it's a gaming system) or if you're planning to use up as much of its lifespan as possible.

When you've bought a desktop system from a refurbished source, all you really need to check is that it isn't going to fall over any time soon. We'd recommend checking the hard drive and RAM for integrity, and maybe doing a stress test on the CPU and graphics chipset. As long as those are fine, you can at least be sure that your system will remain in working order as you use it.

Refurbished Laptops

If you've ever owned a laptop, you'll know that they aren't very customisable. There are some parts you can replace, like batteries, keyboards and even screens, but the most important components are integrated into the motherboard. It is possible to replace some laptop parts at home, but the core

components – the motherboard and CPU – if you tried to replace those, you'd essentially have a whole new laptop.

For this reason, refurbished laptops have a slight edge over refurbished desktops. Even those that have been taken apart and repaired have been handled by either the manufacturers or someone who has a very good idea of what they're doing. That creates a level of trust in the performance and quality of repairs that might not be there with more the complicated desktop refurb.

Generally speaking, it's a good idea to buy a refurbished laptop in any case where you don't require the most high-end unit available on the market. You get the choice of spending less of your budget on the system you want or getting better specifications for the money you spend. Either way, it's better value. Looking for a well-known brand is still important, since that determines the baseline level of quality, and in some cases you'll still even have the manufacturer warranty.

As usual, though, the ambiguity of the term 'refurbished' can be an issue. A refurbished laptop could be one that has had faulty parts replaced with fresh examples. It might be one that has had a cracked screen replaced with a completely new one. Or it might be a second-hand one that has been reformatted, put in a new box and sold as a reconditioned unit. There's no way to be certain what route it took back to the shelves unless the retailer tells you.

At the minimum, a refurbished laptop should at least have had its hard drives



wiped and its exterior given a good clean, if not replaced entirely. Make sure your expectations are tempered, though. Laptops that have been used are never going to look the way they did out of the factory, whether it's dust in the hinges or scratches on the case.

As with desktops, you may find that if you buy a refurbished laptop, you're unable to chance its specifications as you would with a completely new model. This might not be a problem if you're the sort of person who doesn't worry too much about the specific components in their computer, but if you're after a particular combination of brands and hardware, you might be waiting a long time until the right refurbished laptop comes around. As we've established, it's difficult to upgrade a laptop yourself, so don't buy one unless it's exactly what you want or you don't care what's inside it.

The good thing about laptops is that even refurbished ones hold

their resale value pretty convincingly. Admittedly, they did so much more reliably before tablets started knocking around the market, but if you want to resell a laptop system – even a refurbished one – there probably won't be a lot of difficulty in doing so.

shell, all you find inside are non-modifiable electronics. That means in a refurb, the most important components should still be in good condition. As long as you can get past the idea that you're not the first person to be swiping your fingers across

a refurbished tablet, check the price of a new model to make sure the discount is good enough. You're looking for 15-20% for a good price, and maybe as much as 40% once you reach the high end of the market. On older devices, the discount can be even bigger. If you want a tablet for under £75, refurbs of items just a couple of years old will sell below that price.

One thing you should be aware of is that refurbished tablets might be older models than the latest ones on sale. This can potentially lead to problems with both software and hardware compatibility. You might be prevented from using certain features of software that you were expecting to be available and, if nothing else, the operating lifespan of the device will be significantly shorter than a new one. The average tablet is probably good for about three to four years or so, but unlike desktops and laptop systems, there aren't any ways to improve tablets when they start to fall below the market baseline.

If you do buy a refurbished tablet, there are a few things you need to check before you can consider your transaction complete. In particular, you should check the battery holds its charge well. It's also worth checking that the screen responds properly to your touch and that it has no major problems with dead or stuck pixels. Remember to check the microphone, the speakers and any cameras too, as these components could be faulty for weeks before you actually notice.

Perhaps the best thing about tablets is that they're currently very desirable items, even second hand, so should you come to resell them, you're likely to get close to your original outlay – certainly much closer than you would with some other devices. This desirability also means that refurbished tablets don't hang

“ If you want a tablet for under £75, refurbs of items just a couple of years old will sell below that price ”

Refurbished Tablets

Unlike desktops and laptops, refurbished tablets are usually good value and tend to be in good condition, because virtually the only way to get them into that state is by returning them to the manufacturer. It's possible for third-party organisations to perform a repair job, but even then it's only on minor aspects like the screen and battery.

If you open up a tablet's

a screen (unless, of course, the screen was replaced!), then the discounts you can pick up are significant and have no practical downside. Manufacturer refurbishments even come with the original warranty intact.

The limited number of system configurations compared to desktops and laptops makes it much easier to check what sort of deal you're getting. Before you buy



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around long. If you think a refurb tablet is for you, don't waste time deliberating. As soon as you spot one on sale, you should buy it before someone else does!

Refurbished Consoles

Refurbished games consoles mostly come on sale through specialist gaming and entertainment retailers, of which the UK has vanishingly few left. That said, walk into your local Game or CEX, and there's a chance you'll spot one for sale, and if you want to save money, it's definitely one way of getting an instant discount on an item that's often hard to find much of a discount on.

Most of the time, a refurbished games console from these outlets hasn't undergone any specific hardware adjustment or repairs. They tend to be second-hand consoles, which have been traded in by regular

customers with their original packaging and given a factory reset by the retailer. At best, you might get the peripherals and cables replaced. In other cases, they may be returned items, which the customer deemed to be faulty but which the retailer can't determine any fault with.

To give a real-world example, Game's policy on refurbished consoles indicates that all units are tested and reset/reformatted before going back on sale, but warns that consoles may not arrive in their original box and may not have all of their original accessories. If you buy a PS4, for example, you may not get a headset, but you are guaranteed the basics: a console, a controller, a controller charger, a power lead and an HDMI cable.

On the other hand, some specialist online refurbishers sell the console only, as a replacement for those that have failed, so owners don't

have to pay for doubles of working peripherals they already own. Check before you buy whether you're paying for the entire system rather than just the base unit.

In any case, buying refurbished games consoles isn't a significantly different prospect to buying any other refurbished system. There may be cosmetic imperfections, but equally, there may not. Accessories may be missing, but equally, they may not.

One of the ways it is different is that gaming companies (Microsoft, Sony and Nintendo) may ban a console from online use if it has previously been associated with piracy, whether that's

through direct modification or some other channel. In these cases, the ban is applied to the console, so even if you buy one second hand that has been thoroughly reset and verified clean, there's a possibility it won't be able to use the online services associated with the brand.

For this reason, if you do buy a refurbished console, it's worth asking specifically about this. If they can't guarantee the console isn't banned from online services, at least secure some assurance that you can return it if it does turn out to be banned.

Hopefully, that's given you a few guidelines to follow when it comes to buying refurbished systems. Remember, in the majority of cases, there's no reason refurbished systems wouldn't perform just as well as new ones, so don't worry too much. Don't forget to check them out, but only as a precaution. Most of the time, you can't go wrong! **mm**

“ Buying refurbished games consoles isn't a significantly different prospect to buying any other refurbished system ”

COMPANY PROFILE

WAVEWALL



Website: www.wavewall.co.uk

Telephone: 033 3011 3481

It's not too often we've discussed issues of male infertility across the 30 years that Micro Mart has been in print, but with one in 25 men affected in the UK, it's better late than never – especially given the success of WaveWall, a company that's launched special mobile phone cases that can help with the problem.

WaveWall is the brainchild of Harry Gardiner, who got the idea when talking to a friend of his. Said friend had come back from a trip to the doctor, who had casually mentioned that it wasn't a great idea to keep his mobile phone in his trouser pocket. Harry was intrigued, and investigated further, discovering lots of studies that show the impact of mobile radiation on male fertility – in particular, on sperm count, sperm motility and morphology.

Gardiner set about trying to do something about it and, as he told us, "I went away to figure out how to develop a product to help with the problem. We turned it into WaveWall basically. It started about a year ago, and now we're selling all over the world."

WaveWall's cases, then, not only hold your mobile phone in place, but they also reflect the radiation from your phone away from your body. Harry brought in independent testing from Underwriters Laboratories, and his design was found to be reducing harmful radiation to the groin area by over 85%.

What's more, it was important to Harry that the phone case he put together was both economical and worked well as a case too.

"It was very important to keep the costs low," he told us. "Our cases

are cheaper than the cost of a lot of genuine leather cases and have our protection built into them too."

He worked with a small team, and now they sell WaveWall cases across the world, offering free delivery and a 100% no quibble money-back guarantee for 30 days – not that many people have used it. "We get a tiny, tiny percentage back. Point something something something percent. Less than ten people in a year wanting to claim on that, and even then they've not read the website or checked out the pictures."

Many people still find male fertility something of a taboo subject, with

Harry and his team ultimately found that "people are very positive and open to what we have to say. We get quite a bit of scepticism, but as soon as we show the evidence behind the product and the fact that we're independently tested, everyone's receptive to it and has no problem with the product."

Even on its own merits as a case, with impact protection, a pouch-style holder and a focus on letting you use the phone without covering up its features, the WaveWall range – starting at £24.99 – looks great value. But it also comes with added protection that it's pretty much impossible to put any kind of value on too...



WaveWall cases offer more than just style

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August DVB500 Smart TV Box

www.idaffodil.co.uk
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Yamaha MusicCast Trio

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Scosche magicMOUNT XL Tablet Headrest Mount

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It's not just drivers who want to use their tablets in the car, but back-seat passengers, too. Scosche's magicMOUNT XL Tablet Headrest Mount uses powerful magnets to hold your device securely in place, once you've inserted a MagicPlate into its case. The mount comes with both large and small MagicPlates, which means you can use it with any size of tablet or phablet, and lets you attach your device in landscape or portrait mode, and any angle in-between.

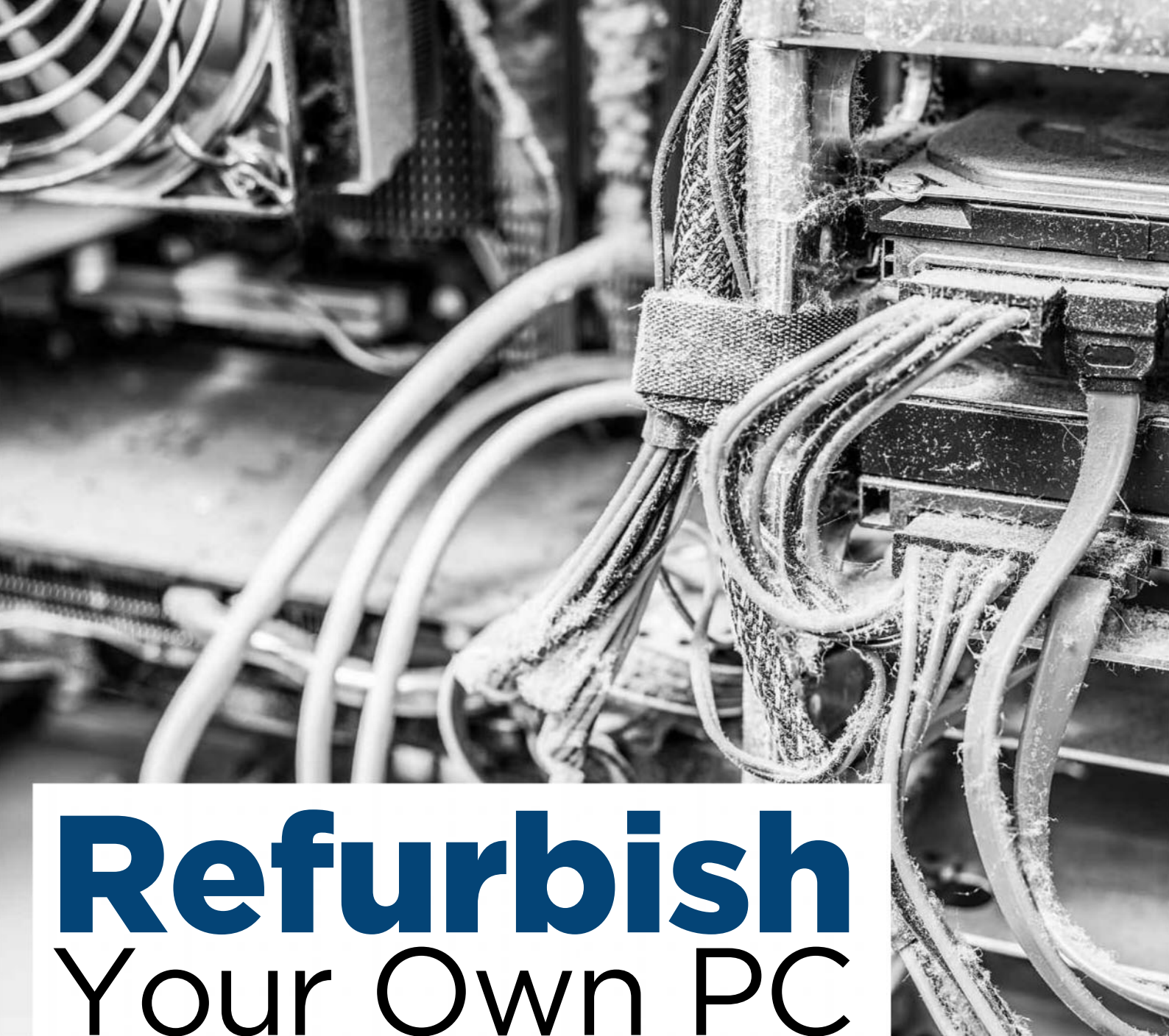


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Refurbish Your Own PC

What can you do to bring your old system up to date?

There's something wasteful about old computers. Most of us know that under the right circumstances our old PCs could be coaxed back into life; we just don't have the time or the means to get it back into working order. But maybe that's just an excuse. Maybe, without a little polish, a PC destined for the tip could be turned into something useful to someone once more.

In actual fact, it's relatively simple to turn an old, unwanted system into one that would be useful for someone. Once it's repaired, you might be able to use it as something useful – a media centre, a minecraft server or a practise Linux box. If not, you could sell it on or donate it to someone who can't afford a new PC of their own.

In real terms, getting a system into working order again isn't that much difficult from upgrading an existing one; you're just not replacing the old parts with new ones. In fact, the hardest part of the entire process is figuring out where you should even start. Luckily, we have that covered for you.

1 Check It Works

Before you do anything with an old system, it's worth checking whether it still works. You may not be able to because it's missing a component or two, in which case that's fine, but if at all possible you want to make sure it still operates to the maximum capable extent.

That might be as simple as plugging in an old monitor and powering it up. It might

be as complex as transplanting a PSU into the case temporarily. Either way, the time to discover that it's broken is *before* you do any work or spend any money on it – and at least if you know it worked before you took it apart, you'll know that it should be possible to make it work again.

At this point it doesn't matter whether it boots into a usable copy of Windows or not. You just want to make sure that the hardware will at least try to boot. If the CPU is dead or the motherboard is fried, no amount of restoration will turn that around except total replacement.

The minimum a basic system needs to work are a PSU, CPU, motherboard, RAM, something to provide graphics output (whether on-board graphics or a video card) and ideally some form of internal storage

“ The hardest part of the entire process is figuring out where you should even start ”

When you're ready, shut the PC down, unplug it, and then press the power button on and off a few times just to make sure it's discharged. Ground yourself by touching the metal part of a radiator. If you're really careful, you can use an anti-static wristband, but as long as you don't spend all day rubbing balloons on the carpet, you probably won't have enough static to shock anything fragile anyway.

Once the system is discharged, you must start to dismantle the components. Start by unscrewing the expansion cards in the PCI slots, then removing them. Place them to one side on a non-static surface (i.e. not carpet or plastic). A wooden table will be fine. Next, disconnect all the internal cables, then unscrew and remove any CD/DVD drives, hard drives and any other pieces.

Finally, unscrew the motherboard and remove it last. If the CPU fan and RAM banks are relatively clean, you may want to leave these seated; removing them is probably more likely to damage them than the alternative.

As you remove pieces, it's a good idea to check the system for wear and tear. Like anything, computer systems are likely to pick up damage as they age. A refurbished system shouldn't necessarily be in completely pristine condition, but if you spot frayed cables, broken plastic and rattling fans, it might be a good idea to replace them before they become a serious problem. A rattling fan could easily become a broken one, and broken fans lead to overheated components.

At the same time, it's worth checking the status of things like screws and blanking plates, especially if your system has had upgrades over the years. Unblanked PCI slots let masses of dust in and out, and missing screws can cause annoying vibrations at best and allow components to slip out of place at worst.

Replacing any of these items shouldn't cost more than a few quid, but they'll make an old system look like new and potentially extend its lifespan.

for any length of time is going to be caked in the stuff. Cleaning dust out of a system is essential for two reasons.

The first is that it just makes the system feel newer. Nothing says 'old computer' like the acrid stink of rapidly toasting dust wafting out of the PSU.

But dust and debris doesn't just look and smell bad. It interferes with the performance of a system too. Dust insulates hardware, trapping heat and making internal air flow virtually useless. It also clogs fans and heatsinks, reducing their ability to shift and disperse heat. In the worst cases, stray hair might get tangled in fans, causing them to seize up completely.

Regardless of a system's age, hot components perform badly and are more prone to failure, so if you're refurbishing a computer, then making sure it's completely clean is the best way to give it a better chance at survival.

To clean a system properly, you need three things: a lightly damp cloth, a dry cloth, a small brush and a can of compressed air.

First, wipe any dust off the components using the damp cloth, using the dry cloth to mop up any water. Be careful you don't snag the cloth on jagged wires or bits of solder! You don't have to get every last speck off, but it shouldn't be difficult to get most of it, especially if it's already quite furred up. Don't try to get the cloth into the nooks and crannies; you can use the brush for that later. For now, concentrate on the surface.

Once you've cleaned off the bulk of the dust and dried the components with the cloths, you need to clean things like fan blades and heatsinks, which are too small or fragile to stick a cloth inside. Compressed air will make short work of the most stubborn pieces of dust that cling to components. You might want even want to take them outside to avoid spraying dust all over yourself and/or your room.

One of the hardest components to clean is the PSU. It's easy for PSUs to pick up dust, but they're difficult to get clean inside, not least because you should *never* open a PSU. The components can be dangerous to the untrained individual, so unless you're an electrician, you don't want

such as a hard drive. If any of these are broken or missing, you'll have to replace them as part of the refurbishment process.

But at this point, concentrate on what happens when you press the power button. As long as you get a single short beep from the POST (power-on self-test) and the storage is detected (even if an operating system isn't), then you're good to continue. If not, you may have some problems to solve before you can continue.

2 Dismantle It

As part of the refurbishment process you should give the system a good clean inside. To do that properly, you first have to take it apart. If you're not confident doing this, take some reference photos before you take it apart, just to make sure you can reassemble it when you're ready.

3 Get Dusting

Even a PC system that's been used regularly will have a lot of dust inside, so one that's been lying fallow

to go near the interior. To clean a PSU, wipe damp cloths down the vents to get the dust out, but avoid using compressed air – you'll only blow the dust back into the unit. If the PSU looks like it needs a lot of cleaning, it might be a better idea to simply replace it. When PSUs fail, they fail catastrophically, so it's probably not worth the risk.

Finally, you need to clean out the case. Again, wipe dust off with a damp cloth and use compressed air and/or the brush to clean out the nooks and any clogged vents. Remember to clean the internal cabling as well as the side panels and base. When the case is tidy, you can move onto the next step: reassembly.

4 Put your System Back Together

Once your hardware is clean, you need to put it back where it belongs. While you have the hardware accessible, you might want to do things like replace the CMOS battery on the motherboard (it's the large, round battery that helps keeps the BIOS settings saved and the internal clock running) or replace heatsinks and fans with newer models.

To reassemble your system, start by installing the motherboard, RAM and CPU, then install the PSU. If you need a separate graphics card, install that as well. For now, don't install a hard drive – or if you do, don't connect it up just yet. Before you

Top Refurbishment Tips

1 If you're refurbishing a system for yourself, remember that you might still have a restore disc from when you originally bought it. These can restore a PC's software to the condition you bought it in, operating system, applications and all. You'll have to download a few updates, but at least you don't need to buy a fresh copy of Windows!

2 Don't spend too much. Old PCs aren't worth a lot of money, so the last thing you want to do is throw away money trying to bring them up to standard. If you need a part for it, don't buy a new one; see if anyone you know has one going free, or at the very least pick it up second-hand. Online groups like Freecycle might be able to hook you up with someone who has one they want rid of. There are plenty of alternatives to buying new components!

3 Get your hardware in order. Chances are if your system is old, then the drivers you have for it are out of date and the manuals you need are banished to some forgotten drawer. Luckily, most manufacturers keep archive copies of documentation and the latest drivers accessible on their websites in perpetuity. As long as you can locate a model number, you can have the latest drivers and firmware for even ancient hardware available to you in seconds.

“ If the PSU looks like it needs a lot of cleaning, it might be a better idea to simply replace it ”

go any further, you want to test that the critical components are working. Reconnect the system and turn on the power. If it boots up normally (up until it can't find a boot disk), then great. If not, you'll have to

chase beep codes and check connections until you spot the problem.

Once you know the bare bones of a system are working, you can start to reinstall the other components. Test it at each stage



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to make sure the hardware is working properly, and remember to cover any unused expansion slots and drive bays with blanking plates to prevent dust getting in.

Connect the hard drive up last. Now that the system is physically clean, it's time to wipe the data as well.

5 A Fresh Install

Assuming you have a legal copy of Windows that you're licensed to install, you should be able to use it to wipe the existing data off the PC and install a fresh copy of the operating system. Simply boot from the installation disc and choose the relevant options. Alternatively, if you want to install an OS but haven't got one spare, you could download and install a copy of Linux.

If you're planning to give the system to someone else without an operating system installed, you can use the free utility DBAN (www.dban.org) to securely wipe the entire contents of a hard drive, leaving it with nothing but empty space and no possibility that your data can be retrieved. That way, whoever receives the system can choose to install their own operating system.

“ **Donating it to a person or organisation might make it seem like you're making a loss, but on the other hand, you get the warm fuzzy glow of helping people out to reward you** ”

Whatever you install, make sure it fits your system's capabilities. Old systems may not have enough RAM to run Windows 10, for example. Ubuntu Linux is a good free choice precisely because its requirements are very low.

When your OS is installed, check that the hardware has been detected properly and, if necessary, install any missing drivers to make sure the system is still in full working order.

6 Finish The Job

Now that your system has been fully refurbished, you need to add the finishing touches by equipping it with the essentials. All systems need a keyboard, mouse and monitor to be properly operational, so if you have old ones available,

clean them up and pair them with the system. If you haven't, new ones can be picked up relatively cheaply. You can sell a system without the peripherals, but if you're giving it away, you want it to be complete.

If you plan to sell the system, be aware that you probably won't get a lot of money for it. Donating it to a person or organisation might make it seem like you're making a loss, but on the other hand, you get the warm fuzzy glow of helping people out to reward you.

Either way, once you've decided what to do with your system, the job is over. Not only have you saved on wastage, you've also provided the world – or yourself – with one more useful computer. Take pride in that, if nothing else! **mm**



Y-CAM

Website: www.Y-cam.com

Telephone: 020 8334 7373

Picture the scene. You're on holiday. You think your home is being protected by a home monitoring system. Suddenly, you get an alert: the alarm is going off, but there's nothing you can do. The neighbours won't answer the phone, and there's no way of checking on your house.

That's what happened to Devin Chawda in 2005, and that in turn led to the creation of Y-cam.

Y-cam was a specific response to that event. In conjunction with his business partner, Sheng Tang, Devin mapped out the product he wanted: a home monitoring system that he could access from wherever he was in the world. "We jumped on a flight to China," Devin recalled, "and booked several meetings with factories, and said this is what we want." By the end of 2006, the pair of them had a prototype, and the first Y-cam product went on sale in 2007.

Even in 2007, it was a very different time. This was before the rise of cloud computing, so "all of our videos were on hosted servers. It was expensive, costing us around £20 a month just to host a customer's videos." This is because making sure your video is accessible, along with at least a seven-day archive, is important to Y-cam.

Now, in the cloud era, it's even easier. Furthermore, the firm doesn't use such technologies as an excuse to tack on hidden charges. The price you pay for a Y-cam product is all you need, with no service contract or anything like that. Sure, you can add premium extras if you want, but the base product will give you the guts of what you need.

It's been a busy eight years. "The challenge was always and still is that consumers don't fully understand the

technology," Devin told us, "and so we genuinely build a product that makes the technology available to everyone." The firm is keen that people aren't put off by jargon and that they get to enjoy the benefits of what's on offer, with the bare minimum of fuss.

Even as competition has grown over the past few years, Y-cam has thrived by sticking to what it does best. "This is all we've ever done," Devin tells us. "Making the technology simple and affordable is what we specialise in; it's what we're passionate about. We've seen direct competitors of ours using similar messaging to us and which are seemingly similar on the surface, but what's not very clear up-front is charging extra for storage." But not with Y-cam.

The software itself, which comes as part of a product bundle, allows you to view streaming footage via a desktop browser or mobile app. Furthermore, Y-cam is working on introducing "smarter alerts" functionality, which includes features such as human recognition, over the coming year. This means that the camera system will only send you an alert if there's a human in its field of view.

There's continual evolution of the products and British-based support for Y-cam too. And with a guarantee that you'll get "the last seven days of rolling footage free, forever," Y-cam's products give you peace of mind, without you being overcharged and ripped off.

They might make holidays a little less stressful too...



Devin Chawda, CEO and co-founder of Y-cam

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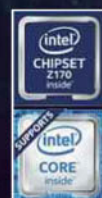
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Where To Find Refurbished Hardware

We look at the best places to find your new(ish) components and systems

The existence of refurbished and reconditioned hardware means there's a great opportunity for everyone to pick up some nearly new bargains, as long as you're willing to be a little bit flexible about their needs. One of the biggest disadvantages to shopping for refurb items is that you don't get to pick what you buy, because availability is on an individual, item-by-item basis. You can either take the bargain you spot or wait for the next to come along.

However, the best way to get the hardware you want – or something close to it – is to check as many outlets and retailers as possible. And to help you do that, we've put together our recommendations for where you can find refurbished, reconditioned and second-hand hardware bargains.

Best For Refurbished Items: **Manufacturer Outlet Stores**

If you know exactly what you want, then your best chance of finding it refurbished – and in the best way possible – is to stake out the manufacturer's web store. Although manufacturers tend to sell goods at the RRP, which makes them expensive compared to the majority of retailers, this is one case where you can get a bargain off them.

Generally, manufacturers don't sell used items through their official stores, but take a look around their websites and you'll almost certainly find a section for outlet goods, which includes end-of-line and reconditioned hardware. It's not always



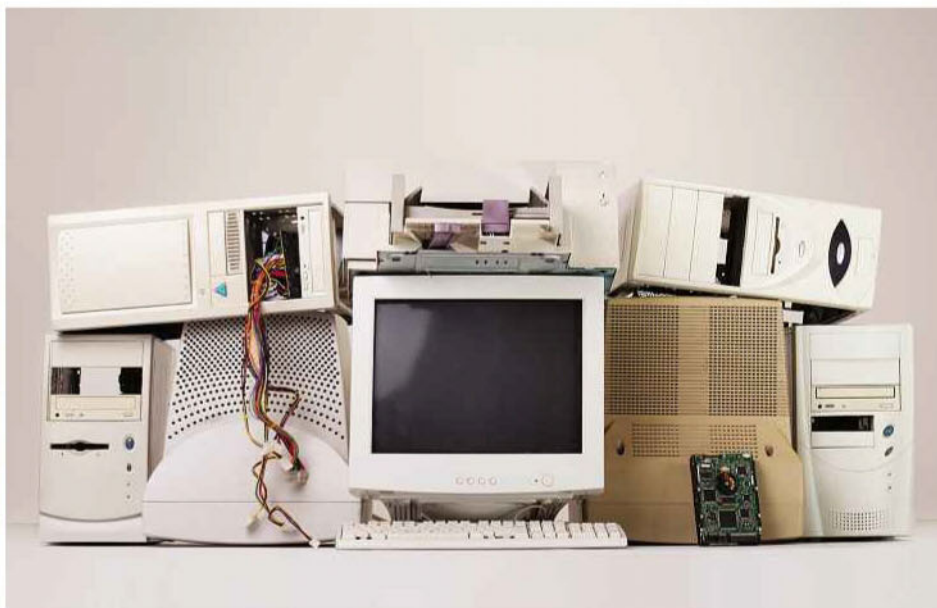
easy to find, but if you stick their name into Google along with 'outlet store', it should turn up.

When items are returned to the manufacturer, swapping out a faulty component for a working one or performing a factory-reset on the software means the item will qualify to be sold as refurbished or reconditioned. This allows the manufacturer to profit off hardware that would otherwise have to be written off, and it allows you to save a few quid on the price.

Buying refurbished hardware directly from manufacturers is also a good way to ensure it's in good working order. When

hardware is being resold by the people who make it, you can guarantee it's been repaired using genuine components and by genuine engineers – and at the very least you can be sure it's gone through the same QA process as a new item, if not an even more rigorous one.

The biggest disadvantage of buying refurb hardware from manufacturers is that the discount isn't going to be fantastic. Since manufacturers tend to sell at the retail price, the discount will only be relative to that. In some cases, that's not a problem (iPad prices are virtually identical in every shop, for instance), but if you're buying a laptop or



“As with everything on eBay, there’s always a chance you can find a bargain”

desktop system, another retailer may offer a different price to the manufacturer.

Example manufacturer outlets include the Apple Store’s Clearance Section, (store.apple.com/uk/browse/home/specialdeals) where you can find refurbished iPads, Macbooks, iPods and accessories in modest quantities. The discounts are similarly conservative, but you should save anywhere between 10 and 50% depending on what you buy. Similarly, the Dell Outlet Store (www.dell.co.uk/outlet) and Asus Outlet Store (eshop.asus.com/en-GB/outlet) are great places to look for refurbished notebook systems, with discounts up to £150 routinely available.

Best For Second-hand Items: eBay

The most obvious place to look for second-hand hardware is on eBay. Here, you can find hardware from across the secondary-market spectrum, from brand new end-of-line hardware that retailers have dumped onto the market as a last resort, to components that have literally been pulled out of a working system just days before by a lone enthusiast wanting to recoup some of their cost.

As with everything on eBay, there’s always a chance you can find a bargain, but the newer and more desirable an item

is, the greater the likelihood of it selling for market value. It’s possible to get your hands on hard-to-find items that may be out of stock from normal retailers, but you also have to deal with the inherent unreliability of person-to-person transactions and potentially long waiting times.

To give an example of how eBay can work for you, we checked out a decent high-end graphics card: the MSI GTX 980 Gaming 4G. Released in September 2014, the cheapest you’ll find it at retail is at Scan, which is selling it for £395 and change. On eBay, you can see listings for purportedly new examples of that card that have sold for £280. That’s a significant saving to make by any standard!

Although there are other second-hand markets you can try, like Amazon Marketplace or Craigslist, eBay is probably the best bet. Its large userbase gives you a good selection of items to buy, while the built-in feedback system and close PayPal integration offer some protection against fraud. It’s not foolproof, but it’s as reliable and safe as any second-hand transaction can be.

Best For Open-Box Items: Computing Retailers

If you want discounts on components, the best place to look is on retailer websites.

Most hardware sales sites have a discount, clearance or outlet section which is used to get rid of stock that can’t be sold as new for any number of reasons, and that’s where you’ll be able to find the best price for components.

Clearance sections are mostly full of open-box items. Any refurbishment is generally quite light (it might be the storage has been wiped or cables have been replaced), and since faulty goods can be returned to the wholesaler or manufacturer, you’ll be buying items that have been returned but checked out as being in working order. They also tend to incorporate end-of-line goods (meaning the last few units from a product line, which the retailer can’t restock) and former display items that have been handled or operated in a limited manner.

All of this means that finding the hardware you want is something of a lucky dip. You might find a data projector with a scratch on the top, a graphics card with a dented box or a pack of ten blank DVDs with one missing. Either way, if you see something you want, don’t hang about. The listings are usually just for single items of stock, so don’t expect it to be there if you come back a few days or even hours later.

The quality of clearance items is generally quite good, but be aware that the range of quality is wider than manufacturer outlets. Whereas Apple or Sony would replace a scuffed case, a retailer might just knock £50 off the price. The risk of buying faulty goods isn’t zero either. It’s possible that someone found a laptop to be faulty and returned it, only for the retailer to place it back on sale because they couldn’t replicate the problem. You have no guarantee, so check the returns policy carefully.

Most popular retailers have clearance sections, though some run their outlet stores through eBay instead of their regular site. Ebuyer is known for its low prices, so any bargains in its clearance section (www.ebuyer.com/search?condition=outlet) are both sparse and extra-desirable for being so cheap. Novatech also has a clearance store (www.novatech.co.uk/clearance.html) with an extensive list of products.

Hopefully, the examples found throughout this piece prove that you can save money on refurbished and second-hand goods without being a committed wheeler-dealer. Just make sure you cut us in if you spot anything that looks too good to be true. **mm**

Refurbished Tablets:

Pros & Cons

Should you get a refurbished mobile device or spend more to get one new?



There's a lot to love about a decent tablet PC. They're compact lightweight enough to be portable from room to room, but heavy-duty enough to pack in serious computing power. Despite what marketers might think, the natural home of most tablets is in bedrooms and lounges, where they can be picked up and put down at a moment's notice in ways that larger PCs – even laptops – can't be.

The only problem with this is that despite being casual devices, they have intrinsically non-casual prices. Only the cheapest, most corner-cutting devices can offer a sub-£150 price, and if you want something with real power (or at least decent screen size), you have to spend upwards of £300 to get it.

But there's some good news: if you're willing to accept a device that's only nearly new, rather than fresh from the factory, there are huge savings to be found.

The rapid release schedule and high-desirability of tablets means that the secondary market is surprisingly healthy. Refurbished devices that have been used, returned and put on sale after a good internal scrubbing (typically by the manufacturer themselves) can be picked up for a considerable saving.

You might understandably be hesitant about the idea of buying 'old' consumer electronics, though, so to make sure you have all the information you need before deciding on a refurb tablet, we've looked into whether or not they're really worth the money and what you can expect if you decide to go this route.

Basic Advantages

The primary advantage of a refurbished tablet is, of course, that it's a lot less expensive than a new one. While savings can run as high as 50% at times, the discount is more typically in the region of 10-20% – which is still a hefty amount off a device that's otherwise likely to be fixed at retail price across multiple outlets.

What makes this particularly good news is that if you buy through an approved refurb retailer, you'll get extras that a typical second-hand sale wouldn't necessarily include.

For instance, with approved refurbishments, you can be sure the hardware has been tested and guaranteed in working condition, which isn't the case with a standard second-hand purchase. This also means that the tablet comes with a decent set of consumer protections attached to it. Most retailers offer the same right of return on refurbished goods as they do on new hardware, and if they don't, that's a warning sign to you that the hardware is potentially untested and may be faulty.

The other advantage is that unlike basic second-hand sale, the hardware will definitely have been set back to the factory state or at least as close to that as is reasonably possible. The software will have been restored to its default settings, and any hardware or accessories that should be included will be replaced. The refurbishment process can be as minor as swapping a damaged USB cable or dented box with a fresh one or as major as replacing the entire screen and case. Second-hand tablets are likely to have

at least minor scratches and signs of wear, but a refurbished one might look like new.

Basic Disadvantages

There are a few disadvantages when it comes to buying refurbished hardware in general, and most of those revolve around the uncertain provenance of the device and its replacement parts.

Unless you buy from a manufacturer-licensed refurbishment program (or better still, the manufacturers themselves), it's impossible to know whether the replacement parts are the genuine article or a cheaper, third-party alternative. Screens in particular have been known to be replaced with flimsier versions that shatter and crack more easily, and while it's not particularly common, faulty batteries have been known to explode as a result of poor manufacturing.

Of course, neither of those problems are especially likely. They're just impossible to discount entirely. The majority of refurbished tablets are sold by reputable retailers and have zero functionality problems or safety issues. The main thing you should worry about when buying a second-hand tablet is simply the matter of age. Even with new parts, these are devices that, by definition, are further through their life cycle than brand new devices. If they're older-generation, they're also nearer to the end of their supported lifespan, if not their operational one.

Unlike second-hand PCs, hardware reliability isn't a huge problem, because most tablet components last for more time than the device is likely to be used for. Batteries are the exception, but these are usually replaced during a refurbishment.

What is a concern is hardware support. The fast pace of platform development means even if you buy the latest device, you might find that the manufacturer won't support an update to the latest version of its operating system a year down the line. Many tablets languish on old versions of Android because their manufacturers won't release the official updates needed to enable users to install the latest version. And that's on new devices. Refurbished ones already have months, if not years of declining support behind them.

Even if you can install the latest software, you might discover that your hardware isn't good enough to run it useably or take advantage of the new features. You might discover that a hardware overhaul has rendered your tablet incompatible with the latest accessories, like iPad users did when Apple switched from 32-pin to Lightning connectors.

Ultimately, the risk of support being cut off depends on the age of the hardware, so take that into account when you buy a refurbished

“ Unlike second-hand PCs, hardware reliability isn't a huge problem ”

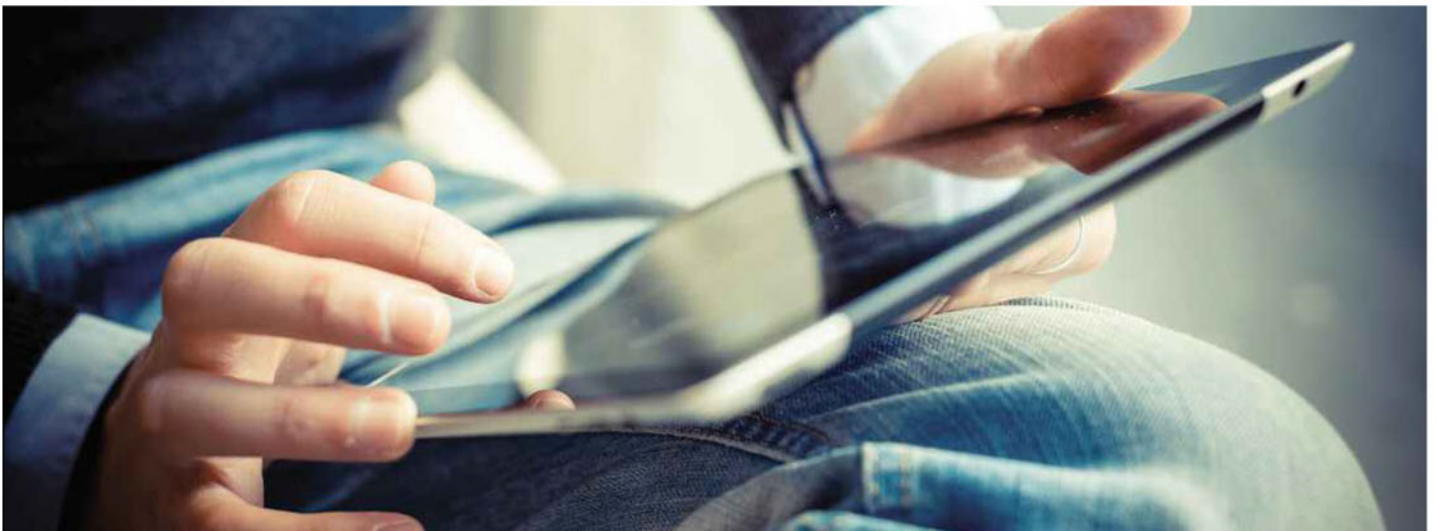
item. It's worth pointing out that just because manufacturer support ends, the device doesn't become unusable; if it does everything you want already, you might feel sore about missing out on new features, but you won't actively lose money because of it.

Apple Turnover

We should point out that if you're looking at refurbished tablets, iPads are a special case. There's no question that if you can find an officially refurbished iPad, you should definitely buy it instead of the same model new. Apple's refurbishment program automatically replaces the accessories with new ones, fully tests the hardware and performs a complete replacement of any damaged or faulty components, with a default replacement of the screen and case. The only way you even tell an iPad is refurbished is because the box says so – presumably to stop third-party retailers buying them cheaply and then selling them as new. They're simply that good.

The only reason you might not do this is because of their availability. Apple's official discount store, which exists tucked away on the main Apple Store website, has only limited stock. It's extremely hit and miss as to whether you'll find the hardware you want. Essentially, you either have to have very loose requirements or a fair amount of patience to buy refurbished Apple hardware, but when you do, you'll be well rewarded.

However, this advice doesn't apply if you buy refurbished Apple hardware from non-approved vendors. Apple won't even look at devices that have been unofficially repaired, so if you're set on joining the Apple ecosystem, you shouldn't either. Official refurbishes, by comparison, give you a warranty as good as if you'd bought the hardware new and full access to in-store Genius Bar support. We don't necessarily agree with the way Apple conducts its business, but that's the reality. Stick with the official outlets and you'll be fine. [mm](#)



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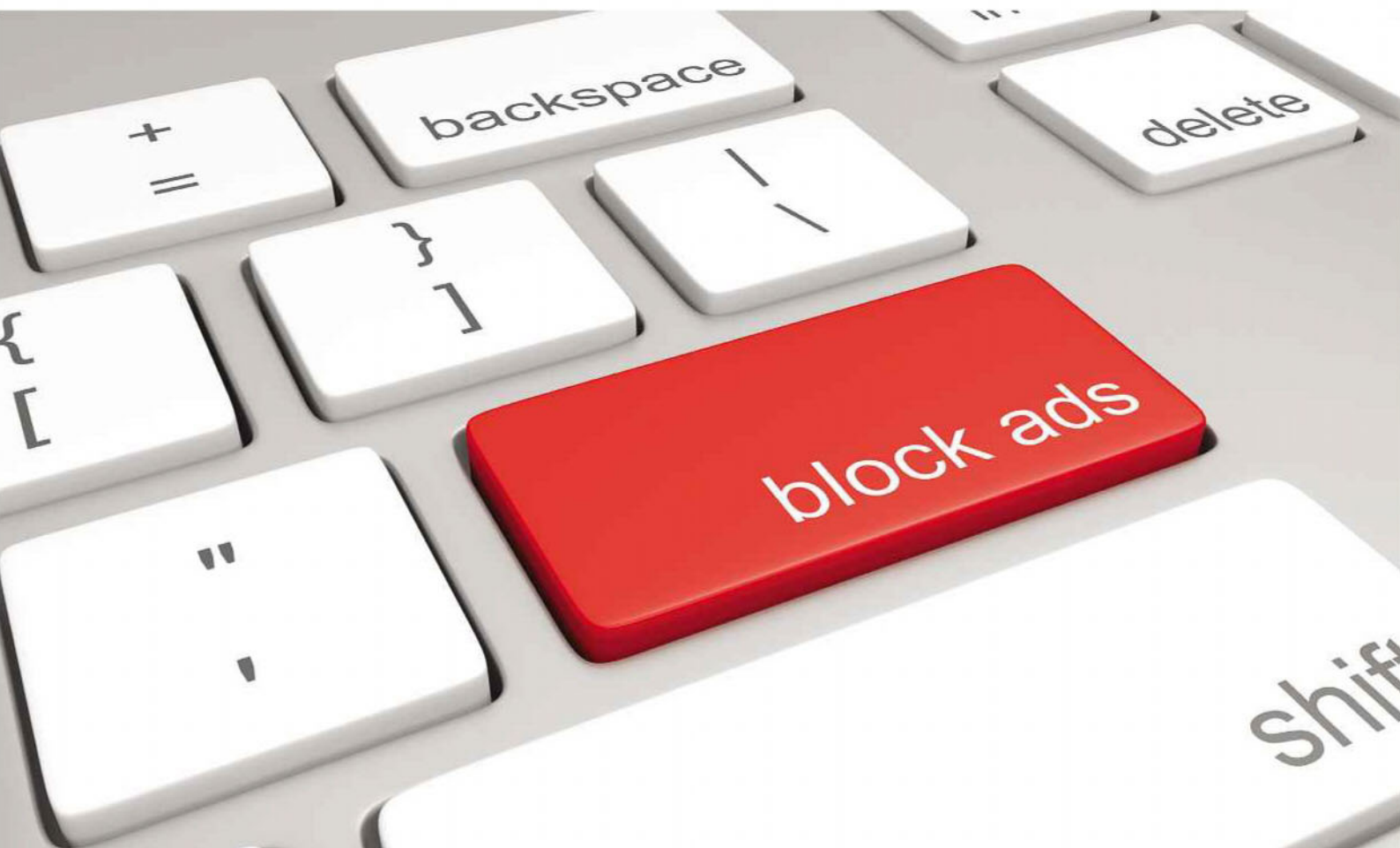


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YouTube Red And The Effect Of **Adblock**

YouTube Red has caused quite a stir among users and broadcasters, but are we responsible for its creation?

YouTube is one of the most popular and visited sites online, and it the undisputed king of streaming video content. It's a site that has something for everyone, and it's also a legitimate business for many YouTube stars, who make a decent living creating video content. Some famous stars, such as video game player PewDiePie, have become millionaires thanks to the massive popularity of the site and , but huge attraction to the Internet-using masses.

A major contributing factor to YouTube's success is that it's always been a totally free site. All of its video content has always been offered openly, and available to all. All users need



▲ YouTube Red has polarised the YouTube community

to do is visit the site, find a channel they like the look of and watch. Simple.

As such, YouTube broadcasters create content for this model, and money is made for both YouTube and the broadcaster via advertising. These ads play before and during videos, with the number of views determining the revenue the creator gets when the revenue is split between YouTube and the creator. It's a deal that's worked for years, but it's about to change with the arrival of YouTube Red.

Bringing Home The Bacon

Before we focus on YouTube Red, it's important to know exactly how money is made via YouTube, so let's dig a little deeper. YouTube, as everyone probably knows, is owned by Google and, as Google runs a business, it wants this part of its empire to make money. This money is made, as we've said, by adverts, and revenue is split between all parties concerned.

“ A major contributing factor to YouTube's success is that it's always been a totally free site ”

There's a basic 55/45% split of income, with the creator getting the lion's share, but there's more to this behind the scenes. YouTube content creators usually get around 55% of the cut, and this comes from ads and views as well as sponsored videos. Money generated by views is paid out per 1,000 views. A single view isn't simply a click on the video, and a viewer has to watch the video for long enough for it to count as an actual view according to Google's analytics. For every 1,000-2,000 views a video gets around \$1.50-2.00.

The actual view count is a little complex. Prior to 300 views, visits are not verified. However, to prevent fraudulent view-bumps and other illegitimate figure-boosting, after 300 views visits have to be verified, which has been known to cause videos to be stuck at 301 views for a time. The verification includes a look at view length, to prevent one or two second visits counting as a view. It's also a method to discourage 'clickbait', where creator will use misleading thumbnails to bolster visits. So, videos need to be viewed for longer, a time limit YouTube keeps very vague to prevent misuse.

Sponsored videos make a more guaranteed figure, as a sponsor will pay an agreed amount for the deal, as well as any other arrangements, such as paying more for certain numbers of views.

The only downside is that YouTubers need to explicitly put sponsor messages in their videos, often presented by themselves. It can feel like a bit of a sell out, but it makes money – and that's what needs to be done to put food on the table. Then, there's Patreon.

Crowdfunded Entertainment

A relatively new method of income for YouTubers is Patreon. This is a system that allows YouTube content creators to receive donations from viewers in exchange for privileged content and rewards. This is a separate income stream and is becoming very popular with YouTube stars, and more are using this every day. Not to be confused with other crowdfunding sites – like Kickstarter – that fund specific one-off projects, Patreon is designed as an ongoing method of generating income.

Patreon only takes 10% of the donations, leaving the creator with 90% of the revenue. This has obvious benefits, and it also brings the YouTube personality closer to their audience, establishing a very real fan base and community, who are willing to support the channel in question. Views can get extra videos, the ability to communicate directly with the creator and other benefits such as no ads.



▲ Google's Analytics is an essential tool for YouTubers, and allows tracking of views and other important info

Patreon has proven to be so successful that many YouTube stars now make more money from it than through YouTube itself. YouTube income is still very important, however, especially for larger channels that don't use the Patreon platform. These channels still rely heavily on advertisements, which is where the trouble begins.

AdBlocked

Few people like adverts, and aside from the companies or individuals making money from them, most would like to see them gone. This applies to TV, radio and streaming services like YouTube. If you want to watch your favourite channels, you'll likely not want to sit through adverts to get to them, or have your program split into small chunks, ruining the entertainment.

“Patreon has proven to be so successful that many YouTube stars now make more money from it”

It's a problem, and one that's led to a solution: Adblock, a browser plug-in that attempts to completely blocks all adverts on any site. This includes YouTube, where it can erase any and all adverts from videos, including the ones that play before a video, ones that play during, and other ads such as banners and pop-ups. It simply strips all of this out, so your videos load up and play instantly without interruption. For viewers who want a life free from adverts, this is a very good thing. For YouTube content creators, however, it is not.

YouTubers make a good deal of their income from adverts, and if these adverts are not seen, none of this income is made. So, from a certain point of view, when users make use of Adblock, they take money away from the YouTube channel they're watching. It isn't hard to see why this has caused such debate; although no one can really blame people for using Adblock, it is damaging to YouTubers who rely on those ads to pay the bills. It brings in a whole question of the morality of using Adblock and whether or not you should.

Whatever your opinion of this is, though, there's little chance of the majority of Adblock users changing their minds and removing the software any time soon. This thought hasn't



▲ Patreon is a donation services that allows fans to give money to their favourite YouTubers



▲ Adblock is used by millions, and that's led to a major loss of revenue for Google and YouTubers

Why?

YouTube Red may seem like a very strange step to some. It's a very complex, and large-scale effort to fix what is essentially a single problem, and that's Adblock. So, a very understandable question many have is, why do this? Why not simply block the blocker, and develop a way to stop Adblock?

The answer is simple really. Any potential software-based prevention will always be circumvented. It doesn't really matter how much money or expertise is pumped into them, software solutions always fail. Just look at the masses of expensive and ingenious methods software companies have employed in the form of copy protection and DRM. Some of these methods have been so extreme, they've stopped products from working at all.

Regardless, DRM and copy protection is always broken, usually within hours, and the pirates always emerge victorious. Likewise, secure computer systems are always cracked by hackers, there's just no such thing as totally secure, and we're even talking about top secret government departments and banks here.

YouTube is simply a collection of public videos, not a military secret, so it would take very little effort for hackers and plug-in creators to bypass any such methods Google could employ. Adblock may be down for a while, but it would be back time and time again. For this reason, an exclusive, subscription-based method is best, and it has the added bonus of extra income. Google has much more control over this, and although exclusive videos will surely leak online anyway, Google has the money in hand, so business damage is done. Sadly, the same can't be said about content creators, even ones that are a part of YouTube. If a video is pirated, and leaked online, creators won't get any money for views at all. Even this method is far from perfect.

escaped the minds at Google and YouTube, either, which have taken steps to combat this drop in revenue – at last report, Google just about breaks even on YouTube – by coming up with the concept of YouTube Red.

Red Alert

Now available in the US, YouTube Red is a subscription-based version of the streaming service. It costs \$10 per month to access it, and for that \$10 you get a version of YouTube with no adverts. 'Yeah, but you can get no adverts with Adblock!' You may exclaim. This is true, but there's more to YouTube Red than ad-free viewing. You also get access to Google Music (with a sub to Google Music also granting access to YouTube Red), as well as exclusive content only for YouTube Red subscribers, coming in early 2016.

This exclusive content comes from YouTubers who sign a deal with Google to produce content for the new premier service. The most notable example of this so far is the world's most successful YouTuber, PewDiePie, who is creating exclusive content for YouTube Red. A new show, *Scare PewDiePie* will put Felix Kjellberg into situations inspired by video games.

Other known exclusive shows include *Sing It*, an X-Factor style show be the creators of the *Kids React To...* series of video and *A Trip to Unicorn Island*, which follow IISupervomanII (Lilly Singh) on a world tour.

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▲ When Google announced YouTube Red, the reaction was instantly mixed

Obviously, the value you place on YouTube Red will depend upon your appreciation of these YouTube personalities, but more content will no doubt flood onto the site in future, with more channels signing up. Also, along with these major features, YouTube Red includes some other extras, including enhanced support for mobile devices, Apple TV, games consoles, Smart TVs and (perhaps the most interesting feature – even more so that the exclusive content) the built-in ability to save and view videos offline.

Shows can be downloaded for up to 30 days and can be watched locally without an Internet connection. This is a legitimately useful feature and one that really should be in the standard version. Mobile users can also run videos in the background, so can listen to music or podcasts, for example, while doing other things.

Is this extra content enough to justify a monthly subscription? As with all things like this, only time will tell. At the moment, we'd say no, not really. As end users, there's simply not enough here to warrant interest. Some neat extra features and very specific extra content isn't a selling point, but Google has promised much more. The issue of attraction for YouTube users isn't the major problem at the moment, though.

Seeing Red

We know how YouTube users earn money. We know that plugins like Adblock take money away from both YouTubers and Google, and we now know what Google plans to do about it, in the form of YouTube Red. We also know that the benefits of YouTube Red aren't all that great out of the gate. Regardless of your stance on this, though, and whether you agree or not, it's clear to see why Google has taken these steps.

The music, movie and games industries have all taken steps to prevent piracy and loss of revenue. Although using Adblock doesn't constitute piracy, it does mean a loss of revenue, so from a business standpoint, something needed to be done. The

problem here is the divisive method Google has used, and even within the YouTube content creator community, YouTube Red isn't a clear cut thing. Some welcome the move, while others loathe it and predict the end of YouTube as we know it.

There's been quite the uprising within the YouTube community, with even big names that have thousands, and even a million subs criticising Google's move. A lot of this stemmed from a general misunderstanding, and even now at the time of writing, the exact nature of the changes YouTube Red will make and what it means for established YouTubers isn't clear.

“ Google has said YouTube will continue to support free, ad-based content, but there's no ignoring YouTube Red ”

Google has said that YouTube Red will be a good thing for content creators and that it'll offer extra income streams alongside existing content. However, some have said that the way the pay checks will be distributed will be unfair, especially with the planned 'revenue sharing' model, which some fear will take money away from channels and pay it out elsewhere. This will apparently divide revenue based on overall view time, then divvy it out to creators. Others are worried that videos may be tagged as private by Google, made unavailable to normal YouTube viewers.

A very common worry is the 99% issue. Basically, many see only the bigger and richer YouTube channels making any money from this service, while the remaining 99% are left out. The



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Patreon RIP?

An widely held online opinion tells us that YouTube Red could lead to problems for Patreon, and channels that use it to boost their income. If viewers have to pay for YouTube Red, why would they want to pay again – let alone send money to one, single site? After all, YouTube Red eliminates adverts, so the major benefit is already paid for.

This is a little misguided, however. Although YouTube Red incurs another cost, it's only for channels and content specific to that service. Yes, there are no ads, but other rewards are limited. Most people who donate to channels via Patreon are fans of specific channels, so the benefits they get are unlikely to change. If a channel using Patreon moves to YouTube Red, this may change things, but any self-respecting YouTuber will be upfront with their audience, and address this.

For channels that don't take up Google's new service, Patreon will still be a perfectly viable, and welcome solution. What's more, it's one that isn't forced upon viewers, and yet gives fans the chance to support their favourite online personalities.

Also, Patreon donations go to the content creator, and no one else (after Patreon takes its 10%). YouTube Red revenue could be split between Google and various creators using the revenue-sharing system, so it's not even clear how much channels will get. This means, at the moment, Patreon is still the better option, and will likely remain so.

Rich get richer and so on. As YouTube Red seems to be focusing on the like of PewDiePie and other major channels, it's easy to understand this fear, and if revenue is going to be paid out based on view time, how will smaller channels get a look in?

Red Dawn

As YouTube Red has only just launched (again, at the time of writing) it's a little too early to tell what the long term effects of YouTube Red will be and how smaller channels will fare. However, as YouTube has always been focused on free, ad-based content, the announcement of a subscription service was always going to generate uncertainty, both among viewers and content creators. One thing is for sure, however, Adblock has had a definite impact on this whole situation. This begs the question, is it right to use Adblock?

This is an odd one really, as there's really only one answer and that's no. Sorry, but it's the truth. Adblock is designed to block ads, which means channels don't get ad revenue. This directly impacts a content creator, and instead of getting revenue for every view of their video, they instead only get a fraction of it, from users who don't use Adblock. This can lead to a drastic loss of income, and this impacts everything in a YouTuber's life. Remember, the majority of YouTubers are just people sat at home making videos. They're not big companies who can easily absorb a little loss. All income lost here affects real lives, even to the point of paying the rent.

At the same time, though, it's hard to argue against using Adblock from a user point of view, as it allows the viewing of YouTube content instantly, with no interruptions. If you watch YouTube everyday and spend a good deal of time online, you'll undoubtedly want to do so without a huge amount of adverts.



▲ The most successful YouTuber, PewDiePie, is on board for YouTube Red



▲ Lilly 'Illegitimate Son' Singh has signed up to produce exclusive content for YouTube Red

It's one of the reasons people prefer it over TV these days, and as we stated earlier, no one likes adverts, especially when you've seen the same ad a million times already.

As PewDiePie argued when defending YouTube Red, Adblock has had consequences. Alongside the constant problems faced by content creators, it's now led to YouTube Red, which directly affects the end user. So, all that time spent enjoying Adblock, ad-free content is now in question. If Adblock had never been used, or at least to the extent it had, maybe YouTube Red would never have existed. Maybe.

Google has said YouTube will continue to support free, ad-based content, but there's no ignoring YouTube Red. At the end of the day it's another income stream for Google and one that gives it a guaranteed amount of revenue, regardless of views or site visits. Once a subscription is paid, the income is there. Because of this and the potential for even more money, Google will push the service. It's always pushed its many services, even ones that have been hated by users. Just look at Google Plus. A cynical person could deduce YouTube Red was always on the cards, Adblock or no Adblock, but whatever the case, Google's remedy is anything but simple and certainly anything but universally welcome.

When YouTube Red matures and more importantly, when it's available internationally, we'll really begin to see the impact it has on YouTubers and viewers. For now, it's an optional service that's the result of viewer habits, so it'll be interesting how well this impact on the streaming site will change and how it affects Adblock use. The eyes of the Internet-using world are focused on Google, awaiting results. [mm](#)

In 1985...

David Briddock picks out some highlights from this special year...

Bill Gates

After success with his BASIC language, Bill Gates relocated to Bellevue, Washington, and hired Steve Ballmer to handle managerial duties. By 1985, the 30-year-old Gates had 910 company employees and more than \$140 million in revenues after licensing the Microsoft Disk Operating System (DOS) for IBM's new Personal Computer.

Steve Jobs

Steve Jobs also celebrated his 30th birthday in 1985, but it wasn't a happy year. In May, Apple's board sided with new CEO John Sculley and stripped Jobs of all executive duties. An angry Jobs resigned from Apple and later that year started NeXT with five other Apple refugees. The same year, Alan Kay introduced Jobs to the Pixar team.

Intel

In a major CPU milestone, Intel launched the 80386 (also called the i386 or 386), a 32-bit microprocessor with 275,000 transistor and 1,000 times faster than its original 8086. The 80386 also introduced the x86 instruction set, programming model and binary encodings. Fast forward 30 years, and today's 64-bit Intel CPUs still implement the x86 architecture for backwards compatibility.

IBM

IBM hired 10,250 new employees in the United States alone during 1985. It also introduced two low-cost desktop printers for its fast selling IBM PC line-up. One was the high-speed impact printing Proprinter, while the Color Jetprinter could handle colour charts, graphs, spreadsheets and text.

Hewlett Packard

Hewlett Packard introduced the Vectra, its first IBM-compatible PC, in 1985. Inside the base Vectra model there was an Intel 80286 CPU running at 8MHz, 256KB RAM, 5.25" floppy drives, a 20MB hard disk and seven expansion slots.

Compaq

Compaq was the very first company to legally reverse engineer the IBM Personal Computer. By 1985, it was on track to be the world's

largest PC clone supplier. In fact, it was Compaq and not IBM that launched the first 80386-based PC. After later struggles, Compaq was acquired by HP in 2002.

Dell

Michael Dell was already selling IBM PC-compatible computers, built from stock components, from his University of Texas dorm room. In 1985, Dell dropped out and used \$1,000 of family-supplied capital to build his own Turbo PC. Selling direct to consumers, with a range of configuration options, he made over \$73 million in the first year.

C++

Bjarne Stroustrup created the C++ language at AT&T Bell Labs, saying, "C++ is a general purpose programming language designed to make programming more enjoyable for the serious programmer." Stroustrup published his book 'The C++ Programming Language' in 1985. It caused a dramatic rise in C++ popularity, which soon became the dominant object-oriented language.

Free Software Foundation

In 1985, Richard Stallman founded The Free Software Foundation, a non-profit corporation created to support free software development. This marked the birth of the open-source movement, which in turn helped Linus Torvalds bring his Linux operating system to worldwide attention.

Smart Watch

The Tissot F1 aimed to be the smartwatch of 1985. The digital display incorporated advanced functionality such as a timer, alarm, chronograph, calendar and time zone selection. But it also featured a touch-sensitive panel, which allowed owners to set the time and switch between various modes.

Sinclair C5

In January 1985, Clive Sinclair launched the Sinclair C5, his single-seater electric-powered 'personal vehicle'. But it was a commercial disaster, selling only 17,000 units and losing Sinclair £7 million. Sinclair Vehicles went into liquidation later the same year. [mm](#)

Personal Computing: 1985-2015



Much has changed since Micro Mart first launched. James Hunt examines the amazing advancements that have occurred over the past 30 years...

The world of personal computing has moved at an astonishing pace since Micro Mart first debuted 30 years ago. Today, there's probably as much computing power in a single street than there was in the entire country, back when the first issue of this humble magazine hit the stands.

If you've come to computing in the years since then – or if you're too old to remember that far back – we've put together this comprehensive history of the PC. Whether you're nostalgic for the good (and sometimes quite bad) old days or simply interested in what you missed, we hope you enjoy reading it.

1985-1995: The Dawn Of The IBM-PC

When Micro Mart launched in November 1985 under the slightly less alliterative name 'Micro Computer Mart', the world of personal computing was still in its infancy. Although home computers first became commercially viable in the late 70s, it wasn't until the 80s that their popularity started to become established with an explosion of new systems and hardware.

The one that really started it all, at least as far as Micro Mart is concerned, was the IBM Personal Computer – the undisputable progenitor of the modern PC market. This system, also known as the IBM Model 5150, is the reason there's a distinction between PCs and Macs (even though they're both 'personal computers') and the reason that, for the first couple of decades at least, your Windows PC was sold as being 'IBM-compatible'. Compatible with the Model 5150 was the point.

“ Although home computers first became commercially viable in the late 70s, it wasn't until the 80s that their popularity started to become established ”

Utilising a 4.77MHz Intel 8088 CPU and running PC-DOS version 1.0, it was undeniably a simple piece of hardware. Although it had an optional cassette interface, it also gave buyers a choice of up to two 5.25" floppy disk drives. If you squint a bit, the IBM 5150 is still broadly recognisable as a modern PC. Paired with its IBM 5151 monochrome monitor, it

Falcon Computers

www.falconcomputers.co.uk

Darren at Falcon Computers got into computers thanks to the mighty ZX Spectrum and Commodore 64. By 1994, he'd built his first PC, and sold it on. Then he built another. And another. And another. And in April 1995, Falcon Computers was born.

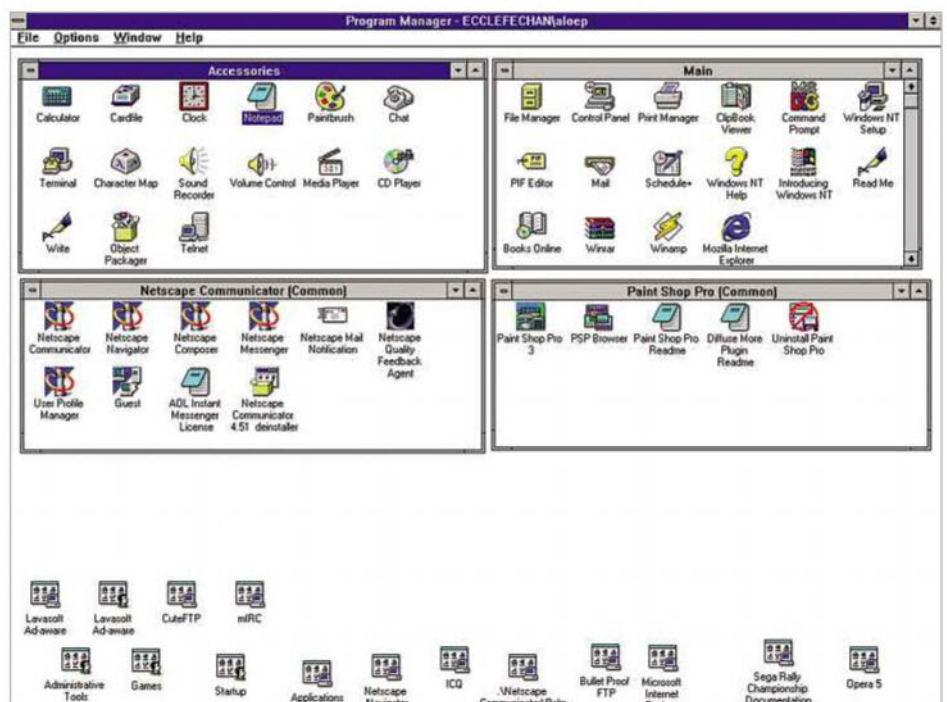
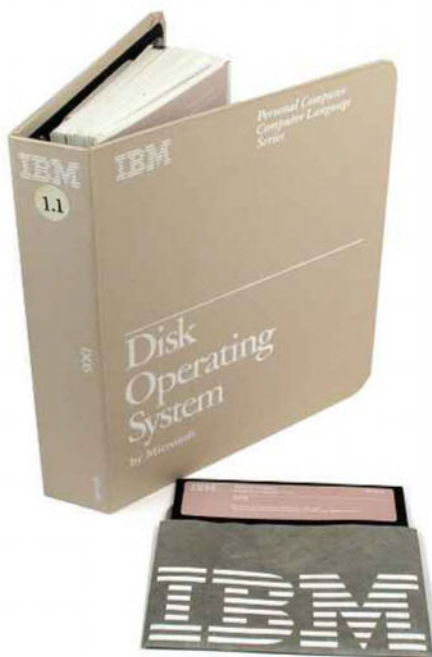
Darren was soon building five PCs a week and then started attending computer fairs. A physical shop followed in 1996, and since then, Falcon has grown into a company with seven full-time staff and five part-timers, turning over £2m a year.

Falcon invested in more shops, but eventually settled on one large store, with all of its staff in one place. Business boomed, and it allowed Falcon to survive the recession of 2009. In fact, as lots of computer stores and websites went out of business, Falcon went back to its roots. It invested in system building, designing and successfully launching a brand new website to allow people to customise their computer.

"I believe we have the best system builder software available in the UK, as most other shops just have lots of pages of pull down multiple choice buttons, while ours is fully interactive and all on one page with moving pictures so you can see what you're getting," says Darren.

Lots of people agreed, and reviews for Falcon's systems were positive, winning awards from the likes of Kit Guru, Custom PC and even this very organ. Recently, Falcon was also nominated for best system builder at the PC Retail awards.

Now celebrating 20 years in business, Falcon continues to thrive and keep Darren busy. "We're still growing and looking forward to the next 20 years!" he says. "And then the next!"





Morgan Computers

www.morgancomputers.co.uk

A company that's been going even longer than Micro Mart, Morgan Computers actually began life as a second-hand camera shop on London's Tottenham Court Road. Since then, it's traded in surplus and end-of-line computer equipment. The aging Leicas and Nikons have now made way for Toshiba, HPs, Acers and the like, but Morgan has remained in touch with its roots. It does a thriving trade in digital cameras and a wide range of consumer electronics. Furthermore, Morgan is now part of the Bentham Group, with access to much larger stocks that meet the company's "value for money" roots.

From its relatively humble beginnings, Morgan has emerged as one of the UK's leading dealers in surplus, overstock and closeout computer stocks. Equipment is typically sourced direct from manufacturers and large distributors and sold direct to the user – from individuals to the SOHO market, education and corporate. Morgan is one of the largest and longest established operators in this field in the UK.

Bentham Ltd snapped the firm's e-commerce business up in November 2009, and Morgan was added to other brands including Inkjets And Toners, www.ijtdirect.co.uk and www.cartex.co.uk.

There's been an evident determination that the Morgan brand will build on its illustrious past with a substantially larger product portfolio, a much wider range of goods and even greater value for money. The tradition of top-quality end-of-line or refurbished products from top manufacturers has thus been maintained and extended. And the bargain deals keep on coming...

has some retro-future charm, like something you'd see in an old sci-fi movie. But in real terms, it wasn't a huge hit. Most of you will have never used one, let alone owned one.

However, the open architecture and canny business-focused marketing of IBM led to the IBM-PC becoming the basis for powerful, adaptable home computing. Throughout the 80s, IBM-compatible systems became the PC of choice for non-hobbyists who wanted a computer that could be used for work and play, whereas other machines – the likes of the Commodore 64 and ZX Spectrum – were primarily associated with home gaming. Only Apple, which had outright rejected gaming to the point where cheaper Macs didn't have joystick ports at all, produced what looked like business machines – and they were too much so in the end. The future of computing wasn't specialised but generalised.

Although several models came and went in the months and years after the release of the IBM 5150 – all of which were, of course, backwards compatible – the next big milestone came barely a year after the launch of Micro Mart. The IBM XT 286 was released in September 1986 and came with a basic 20MB hard disk, 6MHz processor and a new innovation: 640KB of zero wait-state RAM (in the form of 128KB on the motherboard and two 256KB additional SIMMs), which could be accessed by the processor almost instantly.

This new feature allowed it to run programs faster than even some more expensive models with faster 8MHz CPUs

and created what is, for all intents and purposes, the personal computing model we still use today: a combination of RAM, motherboard and CPU with access to both permanent and removable storage.

By the mid-80s IBM was already making as much money from many PCs as the rest of the industry combined. More than half of companies used IBM systems, whereas the second biggest slice of the market – Apple's – was just 16%. Aggressive pricing kept IBM systems popular even as 'lookalike' systems (which used reverse-engineered, non-infringing BIOS systems) grew in popularity, increasing the market for IBM-compatible software and hardware.

By the end of 1986, an IBM system that had cost \$1,600 could be bought in compatible format for as little as \$600, which was cheaper than an Apple II. So it was that IBM systems running MS-DOS became popular in homes as well as the workplace. In 1986, games company Electronic Arts began to build games specifically for the PC, instead of simply porting them from other systems. In 1987, Commodore and Atari, once titans of home computing, announced IBM-compatible systems to try to take on some of the market share.

Although the prevalence of IBM-compatible clones made the platform a huge hit, it did so at the expense of IBM's control over the market. Its 'official' hardware was seen as expensive,



and while it was popular with companies who wanted full solutions, the home market was overrun with much cheaper compatible systems, to the point where the first home PC based on the new 80386 platform was the Compaq Deskpro 386, which wasn't made by IBM. It was the first time a change of processor architecture for the PC-compatible platform hadn't been led by IBM, and shipped with Windows/386, a version of Windows 2.1 that had been adapted for the new CPU.

By 1990, the PC market had become so popular that companies preferred to get the PC versions released first, even though the Amiga and Atari platforms had notionally better graphics and sound capabilities. Technical capabilities were no match for the superior userbase the PC offered. 65% of the home computer market was made up of IBM-compatibles, with the Amiga at 10% and every other platform, including Atari and Apple, somewhere below that.

It can be argued that the IBM-compatible struck the killing blow to competing platforms with the release of Windows 3.0

4 People Who Changed Computing

1. Bill Gates

It's popular to bash Bill Gates and his monolithic software company, Microsoft, but it's fair to say that without them the world of home computing might look very different. Microsoft's operating systems power more than 90% of all desktop systems, and Gates's personal success is almost incalculable: he's nearing 30 years straight on the world's richest person list. Gates's contribution wasn't necessarily Windows itself but the creation of a standardised platform for hardware and software that made the market easy and profitable for developers to enter. Whether you love or loathe Microsoft, it's true that without its imperial qualities, there'd be far fewer PCs around, and we'd all have much less to do on them.

2. Steve Jobs

As the co-founder of Apple, Steve Jobs helped create the first home computer with a GUI (the original Macintosh) before being forced out of the company. While at his new company, NeXT, he managed to help create Pixar before NeXT was bought by Apple. Jobs was re-installed as CEO to return the company to profitability, and the decade that followed saw the introduction of hardware like the iMac, iPod and iPhone, as well as software like the App Store and Mac OS X. When Jobs died of cancer in 2011, the computing industry lost a powerful innovator, and again – even if you dislike Apple and its products, you can't argue that the industry wasn't stronger with him in it.

3. Michael Dell

The founder of Dell, Inc. (of course), Michael Dell has been selling personal computers since the 1980s. His big innovation was to bet capital on the idea that manufacturer-sold PCs could undercut a retailer-led model. He was right. He started his company out of a condo in 1984 using \$1,000 of investment, and by 2001 it had officially become the world's largest PC maker. Dell's size and influence means it has, to a large extent, controlled the pace and development of desktop systems for over 20 years. He was even the first to sell them online, in 1996. The computing industry might still exist without Dell, but it'd probably look a lot less healthy.

4. Tim Berners-Lee

If one man can be said to have invented the future, Tim Berners-Lee might be a strong candidate. In the early 90s, while working for CERN, Berners-Lee managed to invent both HTML and the HTTP protocol that powers the web to this day. He didn't invent the internet, but before he created the web there wasn't any part of it that was accessible to the lay-person. The first web page went live on 6th August 1991. In 2014, the one billionth website was announced. Maybe he was just in the right place at the right time, but whether it was genius or circumstance that made Tim Berners-Lee famous, it's indisputable that he came up with the thing everyone needed but no one really knew they wanted. That doesn't happen often.



in 1990. As far back as 1985, Amiga and Atari ST systems had showcased impressive sound and graphical capabilities, while the IBM had survived in spite of, rather than because of its quality. Windows 3.0 gave PC-compatibles similar abilities, allowing them to play video and complex audio.

Windows 3.0 was also the point where the tide began to turn against the command line-based MS-DOS. It was a significant rewrite of earlier Windows versions, with a revamped user interface, superior memory management, the ability to run text-mode MS-DOS software natively and basic multitasking. Windows 3.0 was far from the first operating system to make these leaps, but it was the first to make them on the IBM-compatible system. It also included games such as Reversi and Solitaire alongside now-familiar programs like Paintbrush (later MS Paint), Notepad and File Manager.

By supporting a 256-colour VGA mode, Windows 3.0 allowed IBM-compatible systems to look better than ever. In 1991, an updated version added 'multimedia extensions' with support for sound cards like the Sound Blaster Pro, including CD-ROM drives. Multimedia computing was now accessible in the home, and a programme of selling Windows pre-installed on PCs began a tradition that we take for granted today: that your operating system can be installed and ready to use the moment you first turn the system on.

Although DOS remained popular (particularly for gaming) long after the release of Windows 3.0, this was the point where things began to change. In April 1992, Windows 3.1 added TrueType fonts and made the media extensions available to all customers rather than just OEM installations. Just months later, in October 1992, Windows 3.11 for Workgroups added network support. By December 1992, 82% of the gaming market was focused on PCs, with Apple taking 8% and the Amiga just 5%.

In 1994, Amiga released its last two computers: the console-style CD32 and the desktop-style A4000T. Atari had discontinued its own final PC, the Atari Falcon, the previous year. Only Apple's Power Macs remained as a serious competitor to the IBM-compatible Windows PC, and even then it was barely putting up a fight. For all intents and purposes, the PC had won the home PC market. And it wasn't even finished.

MicroDream

microdream.co.uk

MicroDream is a Devon-based company, which has also had reason to celebrate in recent years. Since its formation in 2009, the firm has specialised in providing high-quality refurbished laptops and desktop computers at great prices. Like several other successful businesses, it's grown from the humble beginnings of being started in a basement to becoming one of the top companies in its field.

After several years of hard work and dedication, MicroDream has now also become one of around a dozen Microsoft Authorised Refurbishers in the UK. There are strict requirements established for the MAR program by Microsoft. These requirements are designed to ensure that you receive a high-quality and professionally refurbished computer.

MicroDream continues to grow and thrive, courtesy of an attitude of putting its customers at the forefront of what it does. "We offer an excellent choice of products at discounted prices," it says, "and take great pride in our customer services. We are always on hand to offer advice on choosing the right product to fit your computing needs."

1995-2005: Multimedia Explosion

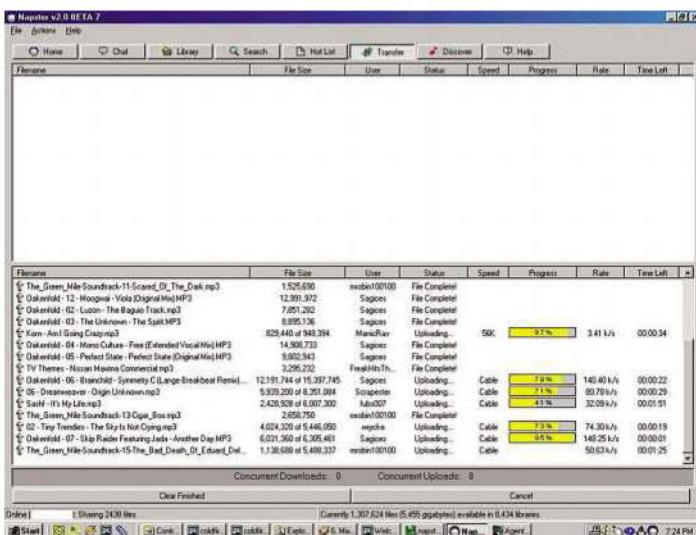
If you had to pick the most significant date in the history of IBM-compatible computing, 24th August 1995 would probably be a solid contender. It was, of course, the release date of Windows 95, and it did what no other operating system had managed to do before: it made PCs attractive.

Sure, by modern standards it's clunky and businesslike, but compared to its contemporaries, Windows 95 looked and sounded like the future. The 16-bit architecture that had ruled for years was replaced with 32-bit architecture that could preemptively multitask, while plug-and-play features did away with complex technical configurations that kept away novice users. Some basic restrictions that had existed in DOS-based systems for over a decade (such as the horribly misconceived 8.3 filename format) were revised away. It was, in many ways, a new dawn for the PC.

Clearly, Microsoft thought so. To accompany the release of Windows 95, it conducted an aggressive marketing campaign that was unprecedented in the history of the personal computer. Bill Gates introduced Jay Leno and licensed the Rolling Stones ('Start Me Up') to make computing look cool and accessible. Every time a tech CEO wheels out a big name star just long enough to get a photo with their arm around them, it can be traced back to the Windows 95 launch.

It was, of course, a total success. Even people who hadn't so much as clicked a mouse button knew that Windows 95 was coming. It made people who didn't own a PC think they could use one. More than that, it convinced them they needed one. Windows 95 took full advantage of the multimedia capabilities the average system now had. On the CD version, you could find 3D games, music and videos. PCs weren't just for work and gaming anymore. They were for everything.

At this point, the PC required to run Windows had an average of 4MB of RAM (8MB was better), anywhere up to 500MB of hard drive space and ideally an 80486 processor with a clock



speed in the region of 50MHz. CD-ROM drives were becoming standard, and 5.25" disk drives had long been replaced by the more compact 3.5" floppy. Indeed, it was possible to buy Windows 95 on floppy disk: 13 in total, formatted using a special file system so they could contain a massive 1.7MB instead of the usual 1.44MB.

Perhaps astonishingly, Windows 95 didn't ship with Internet Explorer. Although the web had been invented in 1991 at CERN, it was still pretty niche. In fact, Windows 95 didn't even support TCP/IP networking out of its box. Internet Explorer 1.0 was added to Windows 95 by the Microsoft Plus! For Windows 95 pack, and it wasn't until the first service pack release that Internet Explorer came as standard with Windows – in this case, version 2.0.

While Windows 95 could even run on 386 CPUs, for many it provided the impetus to upgrade to the latest processors on the market. These fifth-generation x86 chips were named Pentiums by their manufacturer, Intel, and they all included something that made them much faster than the standard 386 and 486 chips: a floating point unit.

The first Pentium chips were released in 1993, with architecture that could double the performance of a 486 chip. In 1994, Intel was embarrassed when Professor Thomas Nicely at Lynchburg College in Virginia discovered the famous FDIV bug,

in which a simple calculation could be shown to give the wrong result if computed on a system with a first-generation Pentium CPU. Despite this, Pentium and Pentium-compatible chips were a success, and their superior mathematical performance helped users in the era of 3D gaming.

While Windows 95 was a huge step forward in making it easy for home users to add and upgrade hardware, another huge leap was made in 1996, with the release of USB 1.0. USB would eventually replace a number of different standards. SCSI, serial, parallel and PS/2 interfaces all gradually relinquished their position to USB, which could transfer both power and data and better recognition abilities. Admittedly, it wasn't until USB 1.1 was released in 1998 with its added pass-through capabilities that the format truly led to so-called legacy-free PCs, but the groundwork was laid with the initial release of the standard.

The high storage capacity and fast data transfer rates of CDs saw them rapidly replacing floppy disks in the commercial market, but the format truly came into its own in 1997, when CD-RW drives started to become affordable (though that still meant in the region of a couple of hundred pounds for the drive and several pounds per disc).

“ By 2005, the big changes in the world of computing were largely happening online ”

Other formats would come and go, including proprietary high-capacity disks like Iomega's Zip Disks, but the plunging price of recordable CDs (and later, the format's interoperability with DVD drives) would ensure that optical discs remained the dominant PC standard for home storage until USB flash drives became truly affordable around a decade later.

As the internet became an increasingly important aspect of Windows and its software, computing started to move online. The mid-90s saw the establishment of the first major web companies. Amazon was founded in July 1994, Yahoo! was incorporated in March 1995, and eBay established in September 1995. Perhaps surprisingly, Netflix began in 1997 as an online video rental store that operated by post. And in 1998, a new search engine called Google launched.

Perhaps the most contentious launch of the late 90s was Napster. Created by Shawn Fanning and Sean Parker, Napster used the fledgling MP3 file format to enable music piracy on a previously unheard of scale, allowing users to upload and download music to one another free of charge. At the time, the commercial sale of MP3s was almost non-existent, but digital piracy was quick to fill the demand. It was already common for computer users to 'rip' music into the format (the first MP3 players were released in 1997), but it's fair to say that Napster took the music industry by surprise.

Despite its notoriety, Napster only existed in its original form for a couple of years before it was crippled by lawsuits and restrictions that prevented any ability to trade copyrighted songs. Nonetheless, it was a huge signal of what was to come, both in terms of file sharing, lax attitudes to copyright law and user-to-user connectivity. Sean Parker would later become the first president of Facebook, in 2004.

Although the dot-com bubble threatened to snuff out the internet as a business medium, it ultimately weathered the



storm. The early 00s saw increasing bandwidth capabilities and data technologies transform the internet into something that would be dubbed 'Web 2.0'. This actually meant an increased focus on user-to-user interactions, including blogs, article comments and social media. Sites like Wikipedia (2001), MySpace (2003) and YouTube (2005) arose during this period, taking advantage of the drive to encourage users to generate the contents of a website for its owners, rather than vice versa.

Perhaps the ultimate expression of this user-to-user ethos came in 2001, when programmer Bram Cohen invented BitTorrent. Previous attempts at filesharing on servers like Kazaa and Napster had involved centralised servers, which became the target of lawsuits and criminal investigations. BitTorrent had no such requirement. 15 years since its creation, it remains the dominant technology for both legal and illegal filesharing and seems unlikely to disappear or be replaced any time soon.

The advent of illegal filesharing did have at least one positive effect, though, and that was in forcing companies to admit that there was a market that was going unfulfilled. In April 2003, Apple launched the iTunes Store as a legal alternative to music filesharing, and it was the first service to offer a catalogue containing content from all five major music labels. Although initially only compatible with Mac systems and the iPod, it later expanded to service Windows (in October 2003) and non-Apple devices, and it provided the template that many other digital retailers would follow.

As for the desktop market, Windows 95 was updated several times, most notably into Windows 98 and Windows ME, but the future of the operating system lay with Windows XP, which was released in 2001 and which was an upgrade of the previously server-oriented Windows NT platform. Although it had its critics, Windows XP probably counts as Microsoft's most successful operating system. Even today, in 2015, it runs on an estimated 12% of computers – more than any operating system other than Windows 7.

By now, an average PC had hard drive storage of around 100GB, DVD drives with CD-RW support built in were ubiquitous, and many PCs even had DVD-RW capabilities. CPUs had reached multi-GHz speeds, and systems routinely had as much as 1GB of RAM. 64-bit processors were also becoming increasingly popular, though no one was quite sure what they could do that made them much better than 32-bit ones, which made uptake slow.

Similarly laptops, a rare, luxury item in the 90s, became big business in the 00s as prices dropped to affordable levels. Desktops were still the must-have item, but that would soon change in more ways than one.

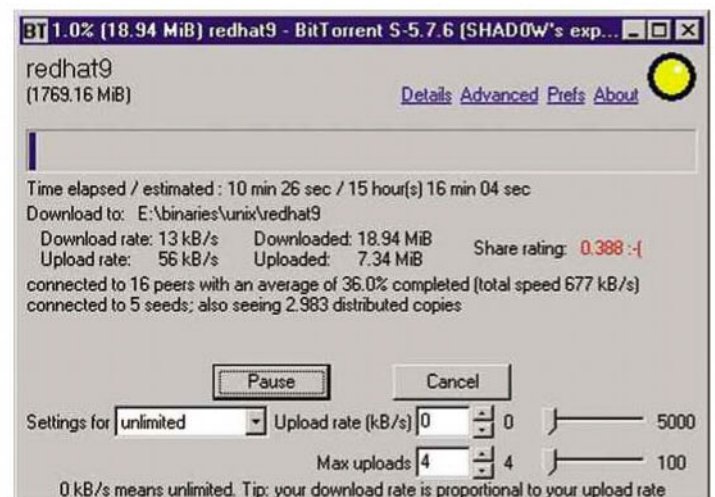
2005-2015: The Information Age

By 2005, the big changes in the world of computing were largely happening online. Web 2.0 was replaced by (or arguably evolved into) social media sites. Companies no longer wanted your content – they wanted you. MySpace may have launched in 2003, but its popularity waned as quickly as it had risen, through a combination of mismanagement and increasing competition. When users began to desert the service, they were heading to something that's still familiar today: Facebook.

Facebook actually launched in 2004, but for years its membership was restricted, first to a specific US college, then to US colleges, then to universities and colleges in any country. In 2006, when Facebook opened to the general public, it was already thriving. The strange part was that unlike sites like Flickr, which wanted you to share your photos, or Blogger, which wanted your writing, Facebook was just a place to hang out and do everything. Or nothing. It didn't mind, as long as you did it on Facebook.

“ The advent of always-on broadband connections meant that PCs were now giving more and more of their capabilities over to online activity ”

The advent of always-on broadband connections meant that PCs were now giving more and more of their capabilities over to online activity. This would reach its ultimate expression when 'the cloud' was realised. Dropbox and Spotify both launched in 2008, encouraging users to stop thinking of their PC as a hub for their files and content and more as a portal to the place they were stored online.





That same year, sales of laptops finally overtook sales of desktops, and the iPhone 3GS gave users a cheap, reliable, data-focused smartphone that could browse the internet as well as most PCs (unless you wanted to browse a site built with Flash, of course). Mobile computing had arrived, and it represented the greatest threat to the desktop system for decades – especially when tablets arrived with the launch of the iPad in 2009, which further fragmented an increasingly divided market. A small mercy, then, that netbooks came and went.

While desktop sales have slowed down thanks to greater consumer choice, the quality of hardware is now better than ever. SSDs came of age in 2005, and after representing a premium choice for some time, they're now cheap enough to genuinely replace hard drives on even a standard desktop system.

Despite this revolutionary change in storage, the biggest hardware leap of the last ten years probably happened in 2006 with the release of the first dual-core desktop CPUs, like Intel's Core Duo. As Moore's Law began to struggle under the limits of commercially viable transistor materials, manufacturers looked to new ways to speed up processors, and parallelism was the solution.

These days, a single household PC is probably one of the most powerful computing devices an ordinary person can buy. The average system has computing power many times that of the earliest PCs. Four CPU cores, each running up to a thousand times the clock speed of the chips in the earliest IBM-PCs. Maybe several thousand times more RAM. Quite possibly more storage on a single 4TB disk than there was in the country in 1980, when a gigabyte of hard drive storage cost \$193,000.

With the right software and hardware, they allow you to do almost anything: assemble ultraHD videos with movie-quality effects, record music as cleanly as any studio, write software that'll run on any device and access virtually all forms of entertainment. A well-built PC can outperform the most powerful games consoles on the market. When you sit down at a PC every day to go and check your email, it's easy to forget the incredible technological path that got us to this point, and the amount of raw power you're taking for granted every time you switch on your machine. For 30 years, it has helped transform our lives. We can't wait to see where the next 30 take it. [mm](#)

Computing's 4 Biggest Flops

Not every new product and idea is going to be a big success. Indeed, sometimes the opposite is true. While looking at the history of computing may give you the impression that it's a relentless climb towards the stars, it's always worth remembering the times the industry got things wrong in the last 30 years as well.

1. OS/2

In the early 1990s, IBM attempted to claw back some of the PC market with its own operating system. Notionally a good idea, the baffling decision was taken to market OS/2 in association with the PowerPC chip, which was incompatible with Windows and its existing applications. Users didn't want the PowerPC CPU and that meant they weren't interested in OS/2 either. What little foothold it had was obliterated virtually outright when Windows 95 came out.

2. Windows Vista

If IBM can take heart from anything, it's that even the king of operating systems can get things wrong. Perhaps Vista was genuinely rubbish, perhaps its release delays meant people got too comfortable on Windows XP. Either way, this iteration of Windows flopped in a way only matched by the stopgap Windows ME some years earlier. Vista was so thoroughly rejected by customers (both in the home and in businesses) that they rushed out its (vastly improved) successor and effectively abandoned the platform early.

3. MySpace

Not the first social network but certainly the first that even people who don't use PCs would have heard of. MySpace had it all: a huge userbase, global recognition, and brands and companies beating down the door to get on the network, yet somehow it squandered it all. Maybe the site's notorious privacy missteps doomed it, or maybe the launch of Facebook was always going to kill MySpace. All we know is that in 2005 it was bought by Rupert Murdoch's News Corporation for over \$500 million, and by 2011 it was sold again for around \$35 million, shedding 1,400 employees in the process. There are collapses, and then there are collapses. This was definitely the latter.

4. The Internet

It's fair to say that it's bounced back quite convincingly of late, but the early 00s were a dark time for anyone who had invested money in this fledgling medium. When the dot-com bubble burst in March 2000, it went on to wipe around \$5 trillion off the stock markets by October 2002. When AOL merged with Time-Warner in January 2000, it was hailed as the coming-of-age for the business of the internet. Three years later, the men who forged the deal were history, and AOL's brand was quietly dropped from the company's name. It took another 15 years for the markets to come close to the peaks they'd enjoyed in 2000, and had things been even slightly different, so would the internet you use today.



Sensible Soccer Grows Up

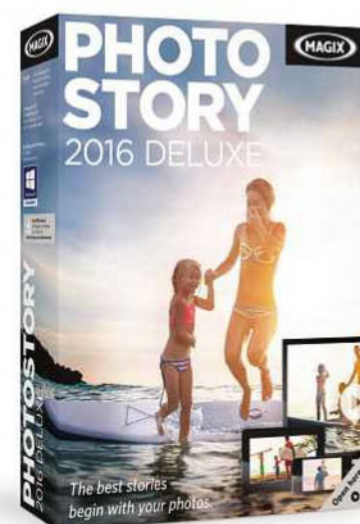
Photo Stories Made Pure Magix

Software maker launches slideshow release

Our friends over at Magix have been in touch to tempt you all into buying another release in the firm's software range. This time round, it's the Photostory package that's on the table.

Photostory 2016 Deluxe lets you "transform individual images and video clips into dynamic films in Ultra HD" as well as generally turning your snaps into genuinely nice-to-look-at slideshows. As is often the case with Magix products, there's a lot of functionality included in this one. Ready? Deep breath.

The new features in the Deluxe version of the package include slideshows that can be made to match up perfectly with your music, some new animated title templates alongside the existing range of movie templates, 360° editing of photos and videos so you can import panoramas and 360° snaps, plus improved travel route animations and top-quality image stabilisation with the help of proDAD Mercalli V2. With support for all popular camera formats and output in 4K resolution and 3D, Photostory 2016 Deluxe is available now online. Read more at www.magix.com.



'Spiritual successor' launched on Kickstarter

Anyone who has even a passing interest in football simulation games will be all-too familiar with the joys of playing the *Sensible Soccer* series. *Sensible World of Soccer* was arguably the pinnacle of football titles at the time and now, many years later, Jon Hare is at it again.

The creator of those fine pixelated football fests has launched a Kickstarter campaign to raise £300,000 to develop *Sociable Soccer*, described as 'the spiritual successor to *Sensible Soccer*'. Assuming Hare gets the money he needs, the game could launch late next year and is planned to be

released on PC as well as the PS4 and Xbox One.

Hare is putting a team together that have worked on some pretty major gaming titles in their own right – including *Max Payne* and *Alan Wake* – and the sociable side of *Sociable Soccer* will be from clans of player avatars whose control and progress is shared by the players represented by their avatars. Featuring more than 500 national, club and custom teams with over 10,000 researched player names, we sincerely hope for the return of some fine customised team names.

Sing it with us now. "You're a goal-scoring superstar hero!"



When the first issue of *Micro Mart* came out, I was just five years old. Unsurprisingly, any money that I might have had at that age would have most likely been spent on chocolate or toys, rather than computer magazines.

That said, even at that young age, I was exposed to technology, with one of my earliest memories being the day my father bought a Commodore 64. I vaguely recall him resting the box on his legs as we sat at the bus stop, but I don't think I understood what it was.

Over the next few months, however, I became familiar with this machine – or at least the games my elder brother would load for us (meaning him) to play.

My love of computers and technology grew from there, but it wasn't until around 2001, during my second year of university, that I bought my first copy of *Micro Mart*. I'd been gifted some money to spend on a new PC, and I spent hours comparing prices of Socket A processors and motherboards.

In the end, being a typical student, I spent the money on beer and rent payments, but my love of *Micro Mart* remained. A few years later, it would become my employer, and the rest, as they say, is history.

When did you buy your first copy?

Anthony

Sony Puts Betamax To Bed

Yes, it's still been selling tapes!

If we told you that Sony was still selling Betamax video tapes, you'd surely laugh in our tired faces, screaming "What year do you think this is?"

While we probably deserve much of the abuse that is aimed in our general direction (we're thick-skinned at *Micro Mart*) on this occasion, you'd be bang wrong. Turns out that Japanese consumers have been able to purchase Betamax tapes up until today. That's all changing, however, as the company has announced that it's stopping sales of Betamax tapes next March.

Production of Betamax videotape recorders ceased in 2002 and now, some 13 years later, Sony is finally making the only sensible decision left by calling an end to the whole Betamax affair. Partnering this news is the forward-looking announcement that Sony is releasing its first 4K Ultra HD Blu-ray discs next year, according to reports. On the list will be *Hancock*, *The Amazing Spider-Man 2* and *The Smurfs 2*.

Wow. We bet people will be queuing up to buy those...

Caption Competition



Two week's ago, we left you with this picture of a very retro computer. Let's see what you made of it:

- **Sawboman:** "That will be one coffee, with milk but no sugar. Now where is the cup holder?"
- **doctoryorkie:** "Micro Mart forum server revealed."
- "Just like the Spice Girls, it only has one gig – and that's on tape."
- **doctoryorkie:** "She only bought it for the storage space – nice cupboards."
- **Ritasueandbobtoo:** "Super model posing in front of the new SFF desktop."
- **The VFM Addict:** "'Hello, Big Boy,' she said. Brenda just could never resist the reel thing."
- **JayCeeDee:** "You remember Billion Dollar Brain, well this was on standby in case Michael Caine broke it, like he did with the one in The Italian Job!"
- **D-Dan:** "And here we have the future's micro computer."
- **Thomas Turnbull:** "This is my first attempt at making a mobile phone. I'm hoping to get the size down later."
- **Thomas Turnbull:** "I just tried computer dating for the first time and got this!"
- **Thomas Turnbull:** "May I introduce my new husband E.R.N.I.E. He's a premium sort of guy."

Thanks to everyone who entered, and congrats to wyliecoyoteuk, who came up with, "This computer is obviously male: it can't multitask!"

To enter this week, come up with something to accompany the picture below, head to the 'Other Stuff' section of our forum (forum.micromart.co.uk), or email us your funnies via caption@micromart.co.uk, remembering to add the issue number to the email subject line. Cheers!



Bye, Bye Beats Music

Apple to call it a day by the end of the month

Apple has announced that it's killing off Beats Music from 30 November.

Pulling no punches in ditching Dr Dre's creation, the reason is fairly obvious. Beats Music has ultimately served its purpose for Apple since it acquired the streaming service last year. The fact is that since the boys at Cupertino launched

Apple Music, Beats Music has been streaming on borrowed time for too long. Now Apple is putting it out of its misery by bringing its users under one Apple Music service.

Beats Music users will see their preferences moved over to Apple Music, so the transition shouldn't be painful in any way. Indeed, we're somewhat surprised it's taken this long to happen.

Huawei Charges Up Smartphones, Fast

Takes mere minutes to recharge

Chinese firm Huawei has announced a possible breakthrough in the smartphone batteries market.

Batteries, frankly, aren't the most exciting tech to grace the earth. They are, however, pretty critical when it comes to our daily mobile lives. Anyway, Huawei has revealed what it's been working on of late,

namely some prototype lithium-ion batteries that can be charged within minutes – five, to be exact.

Providing up to ten hours talk time, this is a development that could, naturally, revolutionise smartphone use as we know it, and you can bet that there will be plenty of tech firms looking at Huawei with envious eyes on this one.

Pope Warns Against Smartphones

Maybe the Pontiff isn't a big Angry Birds fan?

The Pope (yes, that's right) has attacked smartphone use, warning of the risks that they pose to traditional family life.

In an address to all-comers at the Vatican, Pope Francis said that "A family that almost never eats together or that never speaks at the table but looks at the television or the smartphone, is hardly a family. When children at the table are attached to the computer or

the phone and don't listen to each other, this is not a family."

Blimey. Talk about a warning from the top, although he does have past form in this area, having already warned people in the past about the dangers of using the internet and smartphones as being distractions rather than improving our lives. He's no technophobe, though. Check out his Twitter account **@Pontifex**.

Firefox Comes To iOS



It's here. It's finally here

Well, it took it's time. Firefox has arrived on iOS, using the built-in WebKit layout engine rather than the traditional Gecko one. You can download it now if you're an iOS user, and you'd have to say that this is arguably one of the biggest app releases for the platform this month.

According to the official Mozilla blog "Firefox for iOS lets you take your

favorite browser with you wherever you go, with the Firefox features you already love including smart and flexible search, intuitive tab management, syncing with Firefox Accounts and Private Browsing." Private Browsing and syncing are certainly welcome features, and we'll no doubt be trying this out over the next few weeks to see how it compares with Safari.

Better late than never, Mozilla.

Google Car Pulled Over

Too slow, say police

One of Google's autonomous cars has been pulled over by the cops in America, but not for speeding. No, this one was going too slow.

The incident happened during one of the regular Mountain View drives, with a post found on the Mountain View police blog reading: "A Mountain View Police Department traffic officer noticed traffic backing up behind a slow moving car... The car was traveling at 24mph in a 35mph zone." As the officer approached the vehicle in question,

he realised it was one of Google's, contacted the operators on board and gave them some advice on avoiding impeding traffic..

Google responded: "Driving too slowly? Bet humans don't get pulled over for that too often. We've capped the speed of our prototype vehicles at 25mph for safety reasons. We want them to feel friendly and approachable, rather than zooming scarily through neighborhood streets." Fair enough, but slow-moving vehicles can be as much of a danger in certain situations. Something for Google to think about, at least.



Snippets!

Vinyl Still Making Money

Whoever said that records are dead was wrong. It turns out that vinyl is making UK record labels more money than YouTube streams are, according to the UK trade association BPI. The head of the association said at a conference that vinyl revenues were worth more than 14 billion music streams on YouTube last year, so it's good to know that there is life in the old dog yet.

Either that or YouTube simply isn't proving a lucrative platform for artists.

TalkTalk Tempts With Upgrades

Some customers may claim it's too little too late, but TalkTalk has announced a selection of free upgrades to kick in from December by way of an apology.

Freebie packages on offer include unlimited UK landline and mobile calls, various TV content and a mobile SIM with a monthly allowance of free texts, calls and data. The company is also throwing in boosted security including improved anti-virus software and its award-winning HomeSafe web filter.

The upgrades are "subject to availability and ongoing relationship with TalkTalk".

China Tops Supercomputer Table... Again

When it comes to supercomputers, China is very much ahead of the chasing pack. The country has tripled the number of supercomputers it has at its disposal compared with statistics compiled in the summer, according to the latest Top500 list with 109 systems making the grade.

The best of the best remains China's Tianhe-2, capable of 33.86 quadrillion calculations in a second. America's Titan system is in second place but is nearly half as fast as Tianhe-2.

None are used for casual gaming, as far as we can tell.

Surround Sound Solution From Edifier

Subwoofer and soundbar do the business

Audio electronics outfit Edifier has released its CineSound B7, a soundbar and subwoofer combo promising a home theatre experience for less than £250.

Edifier claims that the CineSound B7 provides crisp, clear sound thanks to its tri-amplifying system, expanding audio from the connected system and the hardware itself is decent enough to look at. This isn't exactly high-end stuff we're talking here, but we're not talking high-end prices either. The metre-long soundbar incorporates four speaker units and two tweeters, and the built-in smart feature detects when a movie or TV show finishes. The standby mode also kicks in following ten minutes of inactivity.

Three presets and built-in controls on the soundbar mean you can adjust audio to your taste and the included wireless remote means you can do so without having to get up from your favourite chair. The included Bluetooth 4.0 connectivity allows connection with compatible devices, and multiple devices can be connected simultaneously through optical coaxial aux or via the couple of RCS analogue audio inputs.

For more information on the £249.99 speaker solution, visit www.edifier.com.



Google Maps Goes Offline

Android Maps app can now be used without online connection

Google has given its Android Maps app the kind of key functionality consumers have been crying out for: offline use.

The app now lets Android devices see directions when not connected to the net, also allowing users to find business locations, opening hours and phone numbers. The update is significant, particularly for those visiting the UK from abroad, as they may not necessarily have a roaming plan.

Of course, there is a data storage issue in downloading maps (downloading Greater London takes up around 380MB on a device, for example), but once you navigate around that, this is a no-brainer. Google has also set data downloads

to kick in with a wi-fi connection only by default to avoid any large data bills, and the system promises to be pretty intuitive, with Google stating that once your map is downloaded, Maps will move into offline mode automatically when your smartphone recognises you're in a location with spotty service or no connectivity at all, switching back online once a connection is found.

iOS users will be thankful of an update to the app on their devices, but they're going to have to wait until that happens "soon".



Component Watch

Shelling out on a great case could be one of the best PC investments you ever make

Spending a lot of money on a case might seem like a bad idea, but when you consider the lengthy investment it might represent it could be worth doing. After all, a well-built case should remain useful for years, assuming you don't start whacking it with a hammer when things go wrong. In case you're still not convinced, we've combed through the online offerings to find the cheapest price available for some of the best cases around, so you can enjoy prices as good as the cases themselves.

Deal 1: Zalman Z11 Plus
RRP: £75 / Deal Price: £52

The Zalman Z11 Plus blends performance with a very distinctive style, with a set of mesh coverings that allow natural airflow to remove heat as well as giving it a cool, industrial look. It's not just about looks, though – the case can seat seven fans in total, with extra vents and dust filters available to ensure heat doesn't get trapped. There are also tool-free fittings for the hard drives and a floor-mounted PSU that cements it as just about what we'd expect to be the perfect blend of appearance, convenience and performance for the majority of PC gamers.

Where to get it: Scan (bit.ly/1QwnecW)



Deal 2: Cougar Challenger 6HM6
RRP: £66 / Deal Price: £63

If you want a case that demands to be looked at, the bright orange stylings of the Cougar Challenger 6HM6 will fulfil your attention-seeking desires. Its top-access drive bays mean you can hot-swap drives, there's space for seven interior fans with two LED fans pre-installed, and there's even space for full-length graphics card to really ratchet up the frame-rates. The gaming credentials are cemented by numerous cable-management features, water cooling channels and vented bezel slots for improved cooling performance. If you hate the colour, it's also available in black for a little more.

Where to get it: Saverstore (bit.ly/1LoHDIQ)



Deal 3: NZXT Phantom 410
RRP: £90 / Deal Price: £79

It looks like something out of a sci-fi movie, and that's not an unfair impression to give. The NZXT Phantom 410 is designed with sleek lines, futuristic angles and all the quality of a case twice its price. A unique and original design delivers high performance cooling advantages with 7 fan cooling options, dual radiator support, quad watercooling cutouts, and five 20W per channel fan controls. One of our favourite cases ever.

Where to get it: CCL (bit.ly/1HaXhgj)



Deal 4: Cooler Master Cosmos SE
RRP: £150 / Deal Price: £119

The Cosmos SE is described as "a sporty addition" to the Cosmos series. We're not sure about that, but we love its design: mesh grilles, aluminium handles and sturdy black scaffold interior. It comes with multiple extractor fans, but really longs for water cooling – there's space for up to three radiators! It's the details that make this case, though – easy access top-panel controls, floor-mounted PSU, cable-management, dust filters – it's got everything.

Where to get it: PC Nation (bit.ly/1HaXqQJ)



Deal 5: Thermaltake Level 10 GT
RRP: £250 / Deal Price: £227

You might think it's expensive (and to be fair, it is) but it's also the case that can do no wrong. Included in the price is a 240mm water cooling radiator, two oversized 200mm fans and a 140mm TurboFan all of which keep your components icy cool, there are five hot-swappable tool-free drive-bays, extended graphics card support, cable management features – everything you can think of, this case has. Even a smart security lock to keep out any LAN-party saboteurs. It's pricey, yes, but worth it.

Where to get it: Scan (bit.ly/10SHNju)



Chillblast Fusion Drone Gaming PC

A budget AMD-based system with a few interesting tweaks

DETAILS

- Price: £499
- Manufacturer: Chillblast
- Website: goo.gl/jeBI9y
- Requirements: Keyboard, mouse and monitor

Last year, AMD took the decision to spread its budget processors across a wider audience, catering for those who want to build a decent gaming system without the cost overheads.

The range of processors AMD released started with the entry-level Athlon 740, then moved up through the numbers, adding an unlocked multiplier-K every other processor, until the launch of the 860K. This FM2+ socket CPU is basically an A10-7850K, but minus the integrated GPU element. It still features the four Steamroller cores, though, a TDP of 95W and a base clock speed of 3.7GHz. Overall, it's a decent CPU on which to base a wallet-pleasing gaming system.

As it happens, Chillblast has done exactly that with the Fusion Drone Gaming PC. This system features the Athlon 870K processor fitted to a Gigabyte F2A88XM-D3H motherboard, with 8GB of DDR3 memory.



▲ Internally, the Fusion Drone offers more welcome surprises

A 1TB Seagate SSHD hybrid hard drive serves as the main storage medium, with Windows 10 Home 64-bit edition pre-loaded and updated out of the box. Since there's no processor-based GPU here, Chillblast has opted for the very capable Gigabyte R7 370 Windforce 2GB card to drive the gaming graphics.

The Gigabyte R7 370 Windforce is an overclocked version of the stock Trinidad R7 370, with a 965MHz base GPU clock speed, and a boost clock speed of 1015MHz – both of which are about 5% or 6% higher than stock speeds. In essence, the card is more than able to handle the likes of *Star War: Battlefront* and *Fallout 4* at 1080 on good settings.

In terms of the usual benchmarks, the Fusion Drone managed a 3DMark11 score of 5,976 and a PCMark8 score of 3,952. While it's not the highest benchmark machine we've had through our doors, those numbers are certainly good

enough for the moderate gamer, and there's plenty of performance within to cope with everyday computing duties too.

The Fusion Drone Gaming PC has some other interesting features, though, beyond benchmark scores. For one, Chillblast has fitted the system with a Corsair H55 liquid CPU cooler, which makes the system exceptionally quiet. Further cooling comes courtesy of a pair of front and rear fans, with the large 140mm front fan fixed to the H55's radiator.

Secondly, the case Chillblast has used is the Zalman T4 micro-ATX gaming case. Rather than opting for a bigger and more elaborate Zalman offering, the choice of the T4 makes the Fusion Drone a more compact, lightweight and unobtrusive PC. True, you may struggle to fit a second graphics card for a future upgrade, since it'll be a squeeze against the Aerocool 500W PSU, but for the sake of having a reasonably discrete gaming system, the Zalman T4 is a good



system build decision. And of course, the system is immaculately presented.

Ideally, we'd have liked to see an SSD used as the main system drive, with a terabyte-plus hard drive as the secondary data drive, and our personal preference lies with the Nvidia GTX970 when it comes to gaming graphics. However, both of those additions would have increased the cost considerably.

This brings us nicely to another highlight of the Chillblast Fusion Drone Gaming PC. At £499, this is an exceptionally well-priced gaming system. Certainly you could get more performance from a range of other systems, but the cost will be reflected in that decision. Sub-£500 for these specs is very appealing indeed.

Overall, we really liked the Chillblast Fusion Drone Gaming PC. It's a good-looking, well-performing and balanced system, perfectly priced and with plenty of great features.

mm David Hayward

A great budget gaming system with plenty of features



SanDisk Extreme 500 240GB Portable SSD

SanDisk expands its flash range with a portable SSD

DETAILS

- Price: £87.99 (Ebuyer)
- Manufacturer: SanDisk
- Website: sandisk.co.uk/home/ssd/extreme-500-ssd
- Requirements: USB port, ideally USB 3.0

Evidence about how far we've come with flash storage is most likely lurking at the back of a drawer. It's a flash USB key that holds 512MB or less, and most people have a few of those gathering dust somewhere.

The other end of that spectrum is the SanDisk Extreme 500, a portable flash storage device that comes in 120GB, 240GB and 480GB capacities while offering speeds in excess of those you might expect from an internal hard drive.

The trade-off here is the size, because the Extreme 500 is larger than most USB keys, being a flattened diamond shape, measuring 75mm along its edges. It's still small enough to easily fit in a pocket, although you also need to find room for the short and rather stiff USB cable that comes with it.

This cable and how it connects to the Extreme 500 isn't the part I liked the most of



“ You can get a similar level of performance for nearly £20 less ”

this design. SanDisk chose to use a bladed micro-B connector cable, the port for which is in one of the corners. Given how thin the whole assembly is and that its construction is entirely plastic, this is probably breakage just waiting to happen.

To protect the port, it also used a rubber plug that you pull to one side to insert the cable. This also looks like it will be quickly broken or removed by anyone annoyed at how messy it looks.

Poor engineering choices aside, the Extreme 500 makes up for those shortcomings with some really great performance. USB 3.0 isn't comparable with SATA-3 for bandwidth, but it can deliver a decent transfer rate if treated well by the device.

In my initial benchmarking, that translated into reading at 332.1MB/s and writing at 301.8MB/s. Even activating UASP 'Turbo Mode' I wasn't able to get faster than this, and I fell short of the 415MB/s read and 340MB/s write that SanDisk claims.

While I couldn't achieve those super high speeds, it was at least double the best physical hard drives and triple what most people would experience, though not the 'X4 FASTER' that is emblazoned on the box.

I should also point out that you can only achieve those speeds if you're reading from or to a device that's even quicker, like a SATA-3 connected SSD.

For those with a 130MB/s hard drive, that's likely to be the

	Read [MB/s]	Write [MB/s]
All	332.1	301.8
Seq QD1T1	22.74	76.56
4K QD1T1	318.6	271.4
4K	20.78	48.21

limiting factor for any transfer, not the Extreme 500.

The other point I need to make is that SanDisk makes a product called the SSD Plus, a 2.5" SATA SSD, and the 240GB version costs less than £60. Combining that with a Xenta USB 3.0 caddy costing £10, you can get a similar level of performance but even greater flexibility for nearly £20 less.

Although I can see that the Extreme 500 fills a niche for now, what I'm really looking forward to seeing is the upcoming Extreme 900, which has USB 3.1 technology in its corner. That product will be more likely worth the extra that SanDisk is asking, whereas the Extreme 500 probably isn't.

mm Mark Pickavance

A USB SSD that outperforms conventional hard drives



BenQ W1080ST+

Looking for a decent living room projector?

DETAILS

- Price: £840
- Manufacturer: BenQ
- Website: goo.gl/pSgLaU
- Requirements: HDMI cables, only one set of 3D glasses provided

BenQ's 2013 W1080ST projector was considered an unrivalled success for short-throw, full HD projectors. Now the company has released the W1080ST+, an updated version that addresses the flaws of its predecessor. But has the company done enough to keep the good name of the W1080ST up?

There's plenty to like about the specifications of the W1080ST+. For starters, this DLP projector has a native resolution of 1920 x 1080, and a brightness level of 2,200 lumens. The contrast ratio is a good 10,000:1, and it can short-throw a 300" projected screen from as little as a couple of metres away (65.7" from a distance of one metre).

Connectivity is good too, with a pair of HDMI ports (one of which is MHL supported), VGA, Type-A and mini-USB ports, a RS232 port, composite video and component video, as well as the accompanying audio in and out ports.

The design of the W1080ST+ is very Apple-like, with a mixture of glossy white tough plastic, with splashes of brushed silver effect plastic around the sides, front and rear and over the lens housing.

There's a cluster of buttons on the top panel, to one side, which includes the power and source, and other control and

adjustments. It's also surprisingly light and compact, weighing a reasonable 2.8kg and measuring just 312 x 104 x 244mm. It wouldn't look too out of place in a living room or mounted from the ceiling in a boardroom or classroom.

Setting up the projected image is a simple enough affair; there's an optical zoom present in the W1080ST+, along with a higher than normal degree of control over the vertical and horizontal keystone. Getting the perfect image doesn't take too long, and in our case it was a few minutes.

The picture quality of projectors has generally left us feeling a little disappointed. All too often we'll come across one that's a little too washed out, or the colours tend to be out as well. The BenQ W1080ST+ was much better than the vast majority we've tested in the past. There was actually quite a high level of

detail, and the image was sharp enough to enjoy in a well-lit living room. The focus was good too, even during fast-moving action scenes.

However, when we activated the 3D feature, there was an odd red tinge that seemed to permeate every scene. We tried to fiddle around with the settings, but there was always a hint of red throughout the entire viewing. Having said that, the 3D images were very sharp and well produced.

Another element that has always discouraged us from using a projector as the sole source of visual entertainment in the living room is the noise factor. The BenQ specification sheet for the W1080ST+ states that the projector has a maximum noise level of 31dBA for normal operations, dropping to 28dBA in economy mode. 31dBA is stated to be as loud as a quiet bedroom at night. Well, we're fairly sure the W1080ST+



▲ The BenQ W1080ST+ certainly looks good

◀ There's a decent amount of connectivity on offer

isn't that quiet. If we could measure it, we'd say it was at least as loud as the average office hum, maybe another 10dBA on top of what's stated.

Overall, though, the BenQ W1080ST+ is one of the better projectors we've used in recent years. The image quality is certainly good enough for film viewing, and if you increase the output volume enough, you'll drown out the noise from the fan in the projector.

mm David Hayward

Plenty of features but a bit noisy



Crucial BX200 480GB SSD

Crucial replaces the BX100 with a drive that is remarkable value for money

DETAILS

- Price: £117.59
- Manufacturer: Crucial (Micron)
- Website: www.crucial.com/uk
- Requirements: SATA port, ideally SATA-3 specification

The BX200 is a very significant product, and perversely that is nothing to do with the technology or design work that Crucial put into it.

That might seem an odd thing to say, even for this writer, but the BX200 has special significance because of where it comes in the transition between conventional drive technology and solid-state drives.

But before I get to that, what does a little under £120 buy you in solid-state storage? On the outside the BX200 is pretty much indistinguishable from all the silver 2.5" SSDs that Crucial has made over the past few years. Its 7mm thick, comes with a spacer to make it fit in a 9.5mm hole and uses standard SATA power and data connectors.

Being the replacement for the BX100 launched a year ago, the design is meant to offer an affordable entry point for those wishing to join the SSD

generation. To help with that Crucial includes in the box links to where you can find a system migration software tool and a licence key for you to use it.

Once you've connected it to your PC, you can either fresh install onto the drive or use the migration tool to move your existing system on to the BX200.

Crucial's quoted sequential read/write performance here is 540MB/s and 490MB/s respectively, and in testing I actually got it to go a little quicker than that.

That's great read speed, reading almost as quick as the SATA-3 interface will realistically go, and the write speed isn't disappointing either.

Where it's less impressive is in the IOPS department, but unless you're running your own datacentre, that's less of a problem.

These numbers, however, do put Crucial in a corner somewhat, from a product separation viewpoint, because they're very

close in read and write speed to the MX100 premium product range. Therefore it wouldn't be unreasonable to assume that the next generation MX range needs to widen that gap again, to justify costing more. And it could do that, if it was technically possible, but it isn't, because SATA-3 has hit the bandwidth buffers.

To be much better than the BX200, any new drive will need to use either SATA 3.2, or exclusively M.2 PCIe. And as most users don't have access to either of those interfaces, that could be a big problem for both Crucial and all those making SSD technology in general.

As for the BX200, it's fast, affordable and comes in capacity sizes that people will like. I'm expecting it to sell well to those who want to swap out their hard drive for flash technology and have the change be relatively painless.

There's a 240GB model for £65.99 and a 960GB option for £233.99, and unlike SSDs of old,

they all perform much the same irrespective of size.

The significance of the BX200 is that it marks the point at which the SATA SSD is truly cost effective for most PC owners and exploits the SATA interface almost to the hilt. The only directions from here are different interfaces or much larger capacities going forward.

Get them while they're hot, I say. **mm Mark Pickavance**

**Fast and affordable
SATA SSD**



Edifier R12U active Speaker

A small pair of multi-function speakers from Edifier

DETAILS

- Price: £14.99
- Manufacturer: Edifier
- Website: goo.gl/QteyzP
- Requirements: Sound source with 3.5mm jack, USB port for power

When it comes to buying a set of speakers, most people have three

things in mind, the size, application and price. For example, you wouldn't buy a pair of 3ft high speakers for your laptop, and you probably wouldn't get a pair of 3" high units to accompany your 60" plasma (although I've seen some Bose speakers that could easily cope with that scenario).

The R12U active speakers from Edifier are, from a price standpoint, probably the cheapest I've reviewed to date. Yet they are superbly made, with high gloss enclosures, available in three colours. Incidentally, the ones I reviewed were white with silver grey inserts and don't look at all out of place alongside my iPod.

The styling and quality of manufacture is outstanding. They look and feel like units costing a lot more, they're smooth to the touch and weighty enough to stay where they're put. The casing is open at the front, revealing the main 60mm driver cone, while the left-hand speaker houses the rotary volume control, which also incorporates the on/off switch. Alongside this is the 3.5mm headphone jack, which automatically switches



▲ The controls and headphone jack are on the front of the left speaker



▲ The units come in three different colours

the sound when your headphones are plugged in. They come with permanently attached yet reasonable lengths of cable for both the audio input and the USB power connections, so you can route them into the back of your PC without having taut cables running across your desk.

I imagine they'll appeal mainly to computer users, because of their diminutive size and USB power

connectivity. Having said that, the 3.5mm audio cable obviously makes them compatible with most media devices, so they could potentially be used while connected to your smartphone or iPod as a media centre.

As I've already mentioned the R12U are quite small, each unit measuring just 70 x 80 x 120mm, and the pair weigh roughly 560g, yet for their size they produce a clear full sound, with reasonable bass quality

even at full volume. While it's not easy to describe what they sound like, I can only stress that the price and size is not an indication of their quality. I sampled them with music from rock to opera, and games that a man of my age should not be playing; in all these scenarios they performed well. Obviously, they can't produce the bass levels you'd get from full-size enclosures with dedicated bass drivers, but they certainly don't output the raspy tinny sound normally associated with relatively small, inexpensive speakers. Consequently, I have no reservations in recommending them.

For those who like to know the stats, the R12U active speaker has a total power output of RMS 2W x 2 (THD+N=10%, F0=1KHz), a signal to noise ratio of 85dBa THD (Total Harmonic Distortion), a frequency response of 30Hz ~ 20KHz (±5dB) and an input sensitivity of 700mV ± 50mV. Personally, I prefer to use the Mark-1 ear to judge whether speakers are any good or not, and mine tell me that these punch well above their price. **mm Joe Lavery**

Good quality sound considering their size and price



Roccat Kova

Streamlined performance from a rather clever mouse

DETAILS

- Price: ~£65
- Manufacturer: Roccat
- Website: goo.gl/09cNzM
- Requirements: Spare USB port, Windows 7 or later for the Roccat software

Roccat has recently released a slew of updated and upgraded products from its healthy range of gaming mice. The likes of the Roccat Savu, Lua and Kone Pure Series are some of the best gaming mice available today, and let's not forget the impressive Roccat Nyth.

A recent upgrade worth looking at is the Roccat Kova. It has an 3500dpi Pro-Optic laser sensor, with an overdrive mode that'll bring the total DPI to a blistering 7000, 16.8 million colour illumination, tracking and distance control processing, 12 programmable buttons, a 72MHz Turbo Core V2 32-bit ARM CPU and 576KB of on-board memory.

The Kova also boasts a 1ms response time, a 1000Hz polling rate, 20G acceleration and an impressive lift-off distance of up to 5mm. These features may seem extreme, but in this market the difference between a successfully selling mouse is the number of cutting-edge features it has available for the user to play with, and the Kova doesn't disappoint in this respect.

The mouse is reasonably large, which we particularly like, and fits snugly in the hand, with access to all the many buttons and added extras within easy reach of



▲ The Roccat Kova is an impressive-looking peripheral



▲ It's a well-designed mouse, with loads of extras and features

your digits. The finish of the top of the mouse is a smooth, toughened plastic with a kind of rubbery feel to it. The sides of the mouse, where you'd place your thumb, little and ring fingers, are made of the same plastic and do a good job of improving the grip and reducing any chance of slipping – no doubt while you're dealing out death in an online game. The overall effect is a good feel; it's sturdy and easy on larger hands.

With the accompanying Roccat software installed,

you'll have full control over every aspect of the Kova's features. You can, for instance, set one custom colour from the usual rainbow of choice to illuminate the wheel, while another colour illuminates from the rear bumper. Or you can set a pulsing, ever changing set of colours for each. The sensitivity can be fine-tuned, and the button assignments can be uniquely set for each of the five available profiles. There's even a way to store and share any in-game trophies you've

earned, and if you combine the Kova with any one of Roccat's keyboards, then you can create some pretty elaborate gaming profiles and transfer key macro information between the two depending on the game you're playing.

In addition, if the above wasn't already enough, the use of the Roccat Easy-Shift+ thumb button adds a secondary function to each button on the mouse. The buttons are placed within easy reach of your finger, regardless of whether you're left- or right-handed, and can increase the total number of button functions to 22. Obviously the increase in the number of available macros allows for a greater user control over the game.

The Kova, though, isn't the cheapest gaming mouse on the market, at around £65, depending on where you look. This may seem a little expensive for a mere peripheral, but considering what you get, it's not actually all that bad. And even if you only touch on the tip of what the Kova can do, you're still left with an excellent performing mouse.

mm David Hayward

An impressive gaming mouse, with plenty of features



Fallout 4

Can this long-awaited sequel live up to the hype?

DETAILS

- Price: £39.99 (plus £24.99 for DLC season pass)
- Manufacturer: Bethesda
- Website: www.fallout4.com
- Requirements: Core i5-2300 / Phemon II X4 945 or equivalent, 8GB RAM, 30GB disk space, Nvidia GTX 550 Ti / AMD HD 7870 or equivalent, Windows 7 or later (64-bit only)



To say *Fallout 4* has been highly anticipated doesn't really do justice to how much people, including me, have been looking forward to this game. And to understand why, you only have to think about its predecessor.

Technically, the last game in the series was *Fallout: New Vegas*, but it's *Fallout 3* we're thinking of here. When it was released in 2008, it was a much different beast to the previous games in the series. Publisher and developer Bethesda bought the rights to the series from the bankrupt Interplay Entertainment, and rather than releasing another isometric, turn-based title, it gave the world an action RPG based on the Gamebryo engine (which also drove *The Elder Scrolls IV: Oblivion*), offering third- and first-person perspectives.

Fallout purists may not have been happy with this decision, but the success of *Oblivion* was a good sign that Bethesda would likely produce something worthy of the series.

As we all know now, of course, *Fallout 3* was a massive hit. From its release in October 2008 to the end of that year, more than 4.7 million copies had been shipped, and it's

estimated that since its release more than 12.4 million copies have been sold.

Gamers couldn't get enough of its open-world gameplay, which allowed them to explore the vast desolation of post-apocalyptic Washington, DC, collecting weapons, talking to NPCs (non-player characters) and completing a ton of missions and side missions. Sure, there were some bugs in the game, but the sheer scale of the world Bethesda had created and the possibilities it offered made up for that. Reviewers loved it too, and it attracted numerous awards.

Clearly, then, *Fallout 4* has a lot to live up to. It's the first proper sequel to *Fallout 3* (*New Vegas* was created by a different developer and was more of a stop-gap while Bethesda worked on the highly acclaimed *Skyrim*), so gamers have had to wait a painfully long time for it.

Based on the same Creation engine as *Skyrim*, it's a game that looks great and plays more smoothly than its predecessor. You'll need a pretty hefty PC to run it, so be sure to check out the full system requirements before you make a purchase.

Assuming your computer is able to run it, though, then you're in for a treat. Set ten years after *Fallout 3* in the American city of Boston, it sees you playing as a Vault dweller, cryogenically frozen, who wakes up 200 years after a nuclear war, but not before witnessing the murder of his wife (or her husband, because you can play as a female instead) and the kidnap of his son. Finally, he regains consciousness and steps out into the wastelands, confused but with a clear purpose: to find his son.

It's a far more emotional setup, and generally the story does feel more polished. Indeed, that's true of everything in *Fallout 4*: it's just like the last game but better. It has everything that made the last game great, with interesting missions, intriguing characters, the ability to pick up and collect almost everything you can see and a huge map to explore and discover. You'll find the familiar Pip-Boy menus as well, and the design of the *Fallout* world, from the huge derelict buildings right down to the cups and papers on desks are in keeping what's come before.

But Bethesda hasn't merely rested on its laurels. True, *Fallout*

4 isn't a huge departure from 3 (why would anyone want it to be?), but the new additions to the package are well worth it. For example, you have a much wider range of companions, and this time around, your actions affect how they feel about you.

And rather than putting a level cap in place, you can continue to upgrade your character indefinitely. Yes, there are a finite number of perks you can apply your upgrade points to, but no doubt there will be DLC packs to expand this further, so even when the main part of the game is over, there's the possibility of more later. This is likely Bethesda's answer to the criticism that when you reached the end of *Fallout 3*, that was it; there was nothing else to do.

In addition to these things, you also get the opportunity to set up bases at various locations around the map, using your resources to create defences, water pumps, generators, houses and more. You also have the option of setting up recruitment radio beacons, which will attract more people to your settlement, and they'll do things like tending to crops and manning checkpoints that you assign them to.



Although this part of the game is largely optional, it does point to another significantly updated part of the game: crafting. Previously, you could go around picking up any old junk you could find, but often the only use for it was to sell it to a trader. In *Fallout 4*, though, almost everything you collect has a purpose. Looking at the Junk section of your inventory, highlighting an item will enable you to see what materials you can get from it. A fire extinguisher, for example, might give you steel, rubber and plastic, while a cup will grant you a small amount of ceramic.

This might seem like a minor change, but it can have a dramatic effect on the way you play the game. Rather than just blitzing the missions, barely stopping to look at the scenery, you might find yourself instead checking out every last corner of a building, picking up odds and ends, before heading back to one of your bases and building some beds for your settlers.

It's not just things for your camps that you can craft, though; you can also modify weapons and armour, should you wish. We can't say we found it that useful, to be honest, because in our

playthrough we tended to merely pick up new weapons as we went along, discarding or selling the old ones. Still, it's an option that's there if you want it, and its usefulness depends on which perks you choose to upgrade.

A more intriguing optional add-on, though, is the Pip-Boy app for Android, iOS and Windows Phone. As fans of *Fallout 3* will know, the Pip-Boy is something that Vault dwellers wear on their wrists, and it provides vital information about them and their surroundings. For the player, it's the primary menu system for the game. What the app does is give players their very own Pip-Boy, which means they can access this same menu system from a secondary device, which syncs with their PC via their local network. Given how much you'll find yourself popping in and out of the menu to access your inventory, check out the map and get reminders of your mission objectives, this is an extremely helpful addition to the experience, plus it's easy to set up and works flawlessly.

Sadly, that's not something we can honestly say about *Fallout 4* itself. Yes, it's an amazing game and yes, you're going to have a

lot of fun with it, but it's also full of bugs. The most obvious of these concerns performance and optimisation. The majority of the time, the game runs fluidly, and even on a system at the lower end of the system requirements, you'll find it runs at a decent frame-rate, but we found that certain areas of the map caused the performance to drop through the floor, leaving us with a messy slideshow-like experience. Of course, if you're running this game on a top-end system, you're probably going to be okay, but recent user reviews suggest even those whose PCs meet the recommended requirements have been having problems.

The second prominent bug is less obvious but makes itself known as the game goes on. As you play, you're given a range of missions by various characters, but those characters might also be involved in the missions given to you by others. This happened to us, and when we accepted the newer mission, the older one became broken, so we couldn't complete it or even delete it from our mission list. During our 30-hour testing time, we also had one of our companions refuse to talk to us, so we

couldn't complete the mission until he'd walked (yes, walked) all the way back to his office in another part of Boston. We later sent that same companion to one of our bases, whereupon he promptly vanished. It turns out he'd gone to another area instead, because he was a central part of a mission there.

There are plenty of other bugs and glitches being found all the time, but hopefully these will be patched in time. What we can't see changing, though, is the lack of multiplayer, co-op or otherwise, which would have been a welcome addition. Clearly Bethesda can only envisage this as a single-player adventure, but personally we reckon a co-op mode would greatly increase the game's appeal. Perhaps we'll see it in *Fallout 5* (well, we can dream).

Thankfully, though, none of *Fallout 4*'s problems break the game completely and, to be honest, Bethesda's games are known for these kind of flaws anyway. Be prepared for them, and you're left with a hugely entertaining adventure, which will last you many hours and which has great potential for repeat play-throughs.

mm Anthony Enticknap

A bit buggy but well worth your time



GROUP TEST

Mid-range Motherboards

While it's great to get your hands on a budget motherboard, there comes a point when you could really do with pushing the pounds a little more to get better support and technology.

The mid-range motherboards, what we'd term as being from £50 through to £130, have an extraordinary level of support, with better features and technology, and they're pretty well priced too.

We take six examples and see what you can get for a modest budget.

Mid-range Motherboards

Gigabyte Z97M-DS3H

DETAILS

- Price: £75
- Manufacturer: Gigabyte
- Website: goo.gl/05U2Co
- Requirements: Fourth- and fifth-gen Intel CPU, DDR3 memory, storage etc.

Gigabyte offers consumers a wealth of choice when it comes to motherboards. The company can deliver low-end, low-price but relatively high specification boards for high-volume system builders, as well as boards for overclocking and high-end gaming desktops – with the price to match as well. However, it feels like Gigabyte has taken a backseat recently, with MSI leading the way in terms of features and component quality, especially in the £50-plus range.

The Gigabyte Z97M-DS3H may well change that perception with this mid-range Z97 motherboard. This is a micro-ATX board that supports the Intel LGA1150 socket fourth- and fifth-generation Core processors. The Z97 Express Chipset enables advanced overclocking features for the unlocked versions of the aforementioned CPUs, along with things like Intel Smart Response Technology and Device Protection with Boot Guard.

There are four DDR DIMM slots for up to 32GB of overclocked 3100MHz memory, a single PCIe x16 slot and a pair of PCIe x1 slots, and six SATA 6Gbps connectors make up the drive connectivity with support for a variety of RAID levels.

Other connectivity includes four USB 3.0 ports with a further two USB 2.0 ports, VGA, DVI, HDMI (with support for 4K resolutions), gigabit Ethernet,



▲ The Gigabyte Z97M-DS3H is a decent enough motherboard

PS/2 combo and the usual HD audio jacks.

In terms of software, you'll get the Gigabyte App Centre on DVD, which offers you an easy-to-use interface that allows better control for overclocking or fine tuning to help boost the system performance. The CPU frequencies, voltages, base clock speeds, power phase and memory clock speeds can all be tuned to your particular specifications. In addition to that, the Gigabyte Cloud Station will provide a secure connection to your PC from a phone or tablet so you can control most aspects of its operation remotely.

The components are well designed, with solid capacitors, a gold-plated CPU socket, ESD protection, anti-surge and humidity protection. It's the kind of protection and high-quality you'd find in the more expensive MSI boards, but this time it's on a slightly cheaper Gigabyte board.

The only gripe we have is the distance between the CPU socket and the fourth memory slot. If you use anything other than a stock cooler and you happen to

own the slightly higher than normal HyperX type memory modules, then you're going to find it's rather cramped when you insert the last stick of RAM. A little ingenuity is called for in this situation, but it's not a huge problem and is easily remedied.

Other than that minor niggle, the board is perfect for both the average system builder, as well as catering more demanding situations, such as overclocking. Provided you don't require SLI or more PCIe slots, then the Z97M-DS3H is ideally suited.

At around £75, it's reasonably priced, considering the amount of technology you get, and it ticks all the right boxes for most system build specs.



MSI Z97M Gaming Motherboard

DETAILS

- Price: £110
- Manufacturer: MSI
- Website: goo.gl/dBLM0V
- Requirements: Fourth- and fifth-gen Intel CPU, DDR3 memory, storage etc.

It's not often you'd associate a gaming-centric, SLI/CrossFire motherboard with the micro-ATX form. Never mind the addition of four DD3 RAM slots, six SATA 6Gbps, two eSATA, a single M.2, six USB 3.0 and six USB 2.0 ports.

The MSI Z97M, however, manages all of this and then some. For a 244 x 244mm board there's a lot packed in, but surprisingly it doesn't look or feel overly cramped. That said, if you were to populate the two PCIe 3.0 slots with average-sized graphics cards, then the 1x PCI 2.0 slots will undoubtedly be covered and thus impossible to access. It's a trade-off, to some degree, but one that you can live with for the sake of a multi-GPU PC.

The M.2 port is a nice advanced addition to this motherboard, where the gamer of this generation could easily include an impressive 512GB



▲ It's not a bad price, and you get some of the latest features too

Samsung XP941 SSD to introduce a higher degree of speed, and there's a nifty isolated audio PCB in the form of Audio Boost 2 too. What this essentially does is reduce noise distortion and offer a higher level of audio power to the user through the Creative Sound Blaster Cinema 2 audio technology, so the inaccessibility of the previously mentioned 1x PCI slots won't necessarily be a problem.

Other connectivity includes optical S/PDIF out, HDMI and DisplayPort, alongside the

six OFC audio jacks and gigabit LAN.

The design of the motherboard is finished with a sports look black and red colouring, along with MSI's imposing dragon badge and logo. Sections of the motherboard, in particular the Audio Boost chip, are backlit, which when coupled with a decent-looking cooler will no doubt create a pretty impressive-looking machine.

Looks are an aspect that MSI has put a lot of effort into in recent years. While to some builders, the motherboard will be hidden behind the side panels of the case, for many the lure of impressive looks sells, which is always good news to the manufacturer.

On the performance side of things, when you load this board up with the latest i7, 16GB RAM, a couple of GTX 970s and an M.2 SSD, you're in for a treat that can't easily be matched and one that will happily play anything on the highest settings.

We were also quite amazed at the cost of this board. At

around £110 or less if you shop around, you're getting quite the deal considering the amount of features and the level of technology involved. And it's not too expensive to be classed as a higher-end motherboard either. Considering the Gigabyte Z97M comes in at around £75, for a mere £35 more you're getting significantly better technology.

Overall, we were impressed with the MSI Z97M Gaming motherboard. It's excellent value for money, it looks fantastic, and it has enough on board for 99% of the system builder population to get stick into.



▲ Considering its size, there's plenty going on in the MSI Z97M Gaming



Mid-range Motherboards

MSI Z170A Gaming M5

DETAILS

- Price: £130
- Manufacturer: MSI
- Website: goo.gl/530sZw
- Requirements: Sixth-generation Intel CPU (Skylake), DDR4 RAM, storage etc.

To take best advantage of a Skylake CPU, you're going to need a motherboard that can not only perform brilliantly, but also provide you with every advantage the new technology has to offer.

You won't go far wrong with MSI's new Z170A Gaming M5 motherboard, then. This impressively presented motherboard, with its MSI dragon logo, is a splendid thing to look upon. But it's not just the aesthetics that make it stand out from the crowd.

The four DDR4 RAM slots offer a maximum of 64GB of system memory, with the potential for running at an overclocked 3600MHz. There are three PCIe x16 slots for multiple GPUs, with each having the MSI Steel Armour upgrade applied that protects against electromagnetic interference and four PCIe x1 slots. Fitting two cards will lower the speed of the first two PCIe slots to x8, and a third GPU will offer x4 at the bottom PCIe, with x8 remaining on the first two.

The Z170A Gaming M5 features six SATA-3 6Gbps ports and a pair of M.2 ports for either PCIe or SATA controller based M.2 SSDs. Interestingly, we noticed that the M.2 ports on the Z170A are mounted slightly higher than normal, which we can assume is to cater for newer M.2 SSDs with 3D V-NAND setups that are



▲ The MSI Z170A Gaming M5, ready for Skylake processors



▲ There's plenty to like about this board, and it's in the price range of the group

“ The overclocking abilities are immense with an appropriate Skylake CPU ”

somewhat thicker than the previous generation M.2.

Furthermore you'll find a PS/2 combo port, a pair of USB 2.0 ports, DVI, HDMI, optical out, a Killer Gaming gigabit Ethernet port and four USB 3.0 ports, including the newer USB 3.1 port and a reversible type-C USB port.

MSI has shown a lot of attention to detail with the Z170A Gaming M5. The heatsinks are well placed around the CPU to minimise any problems that may arise from over-large CPU coolers, and MSI has included titanium chokes and better designed capacitors to

improve the already impressive specifications.

Other equally impressive features can be found throughout the Z170A Gaming M5; the list is really quite extensive and includes such elements as a programmable set of hotkeys that at a press of a button will activate an overclocking profile for an extra performance boost. There's also adopted Nahimic sound technology on offer and of course the Killer Gaming LAN manager with optimised bandwidth and traffic priority settings.

The overclocking abilities are immense with an appropriate Skylake CPU fitted. With something like an i5-6600K installed, you'll be able to hit a stable 4.2GHz or so easily enough. With a more elaborate cooling solution in place, you'll no doubt be looking at higher numbers.

This is without a doubt one of the most impressively designed and well featured motherboards we've tested and reviewed in some time.

Surprisingly, though, the MSI Z170A Gaming M5 isn't quite as expensive as you would first imagine. It comes in at around £130, making it the most expensive motherboard so far, but still only £20 dearer than the MSI Z97M and within the range of the group budget.



Gigabyte Z97X-SOC Force

DETAILS

- Price: £130
- Manufacturer: Gigabyte
- Website: goo.gl/xNDTDZ
- Requirements: Fourth- and fifth-gen Intel CPU, DDR3 RAM, storage etc.

This second Gigabyte motherboard is the oldest board out of the group, by at least six months, but there are enough features to still give the other entries a run for their money.

The Gigabyte Z97X-SOC Force is a fairly impressive overclocking enhanced ATX motherboard. It supports LGA1150 socket CPUs (Core i3, i5 and i7), with four DDR3 DIMM slots for a maximum of 32GB of 3300MHz overclocked memory. As for graphics and other expansions, there are two shared bandwidth PCIe x16 slots (dropping to x8 when both slots are occupied), two PCIe x4, a single PCIe x1 and two PCI slots. Therefore anything up to four-way SLI or CrossFire is fully supported.

Connectivity is good, with four USB 3.0 and four USB 2.0 ports, optical S/PDIF, VGA, HDMI, DVI, DisplayPort, a PS/2 combo port, a six audio jack block and gigabit

▲ *It lacks some of the better features found at this price range*

Ethernet. On-board connectivity for storage includes a single SATA Express connector and six SATA 6Gbps connections. Alas, there's no M.2 connectivity due to the age of the motherboard.

The board layout is good, though, and features some overclocking technology. You'll find the same kind of quick overclocking buttons and switches as seen on the MSI Z170A, with a couple extra for a Turbo mode and switching

between a single and dual BIOS mode.

Additionally, there are also some decent extras on the Z97X-SOC Force, such as an added auxiliary six-pin power port for the PCIe slots to improve system stability when overclocking and when the motherboard will be used in high-end setups. There are also a couple of USB ports on the near-side of the board, facing where overclockers would position themselves for testing. These enable you to fast load configurations or install benchmark software without having to reach around to the IO ports.

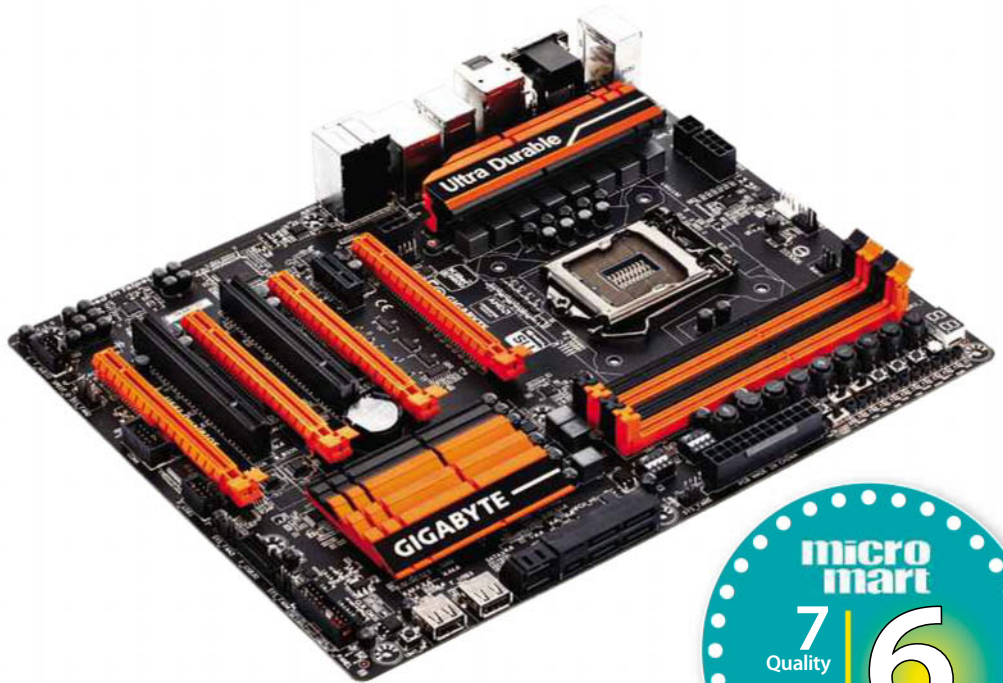
The layout of the motherboard is generally good, with a decent amount of space left around the CPU socket for more outlandish cooling solutions to be used without interfering with the surrounding components. And while we're on the subject of space, there's ample room between the PCIe slots for large graphics cards.



The design features an orange and black theme, over the chipset heatsinks, half the memory banks and the PCIe slots. It looks good enough, but it does lack the aesthetic punch that the MSI motherboards tend to deliver. However, we're sure it'll appeal and look good enough within a well-designed, LED-lit system.

The Gigabyte Z97X-SOC Force is an interesting and decent motherboard. There's certainly plenty going for it in terms of technology and performance, but it's lacking some of the more modern components.

The price is also a bit of a bugbear with us. Despite the age of the motherboard, it's still going for around £130, which places it at the top of the range and equal to the MSI Z170A motherboard. In all honesty, then, if you're going to pay out for a £130 motherboard, the MSI Z170A would be the obvious choice in this instance.



▲ *The Gigabyte Z97X-SOC Force is an overall good motherboard*

Mid-range Motherboards

ASRock H81M

DETAILS

- Price: £50
- Manufacturer: ASRock
- Website: goo.gl/CwCDIP
- Requirements: Fourth- and fifth-gen Intel CPU, DDR3 memory, storage etc.

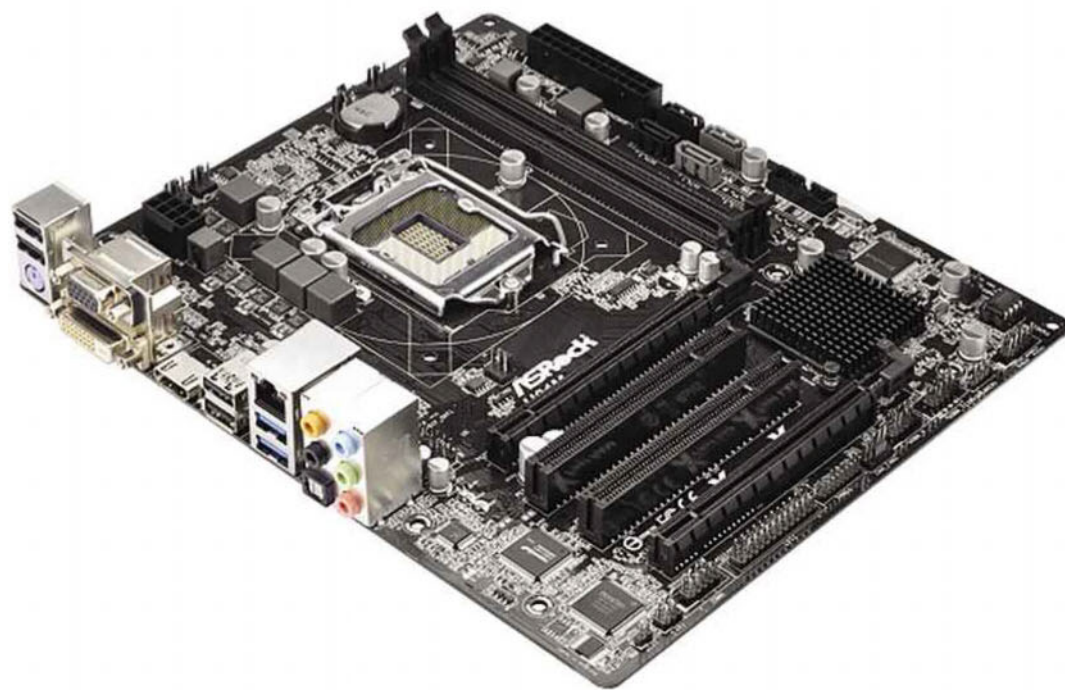
We thought we'd tone things down a little for this entry. £130 is a good amount for a motherboard spend, but what's at the other end of the group budget and is it worth spending £50 on?

The ASRock H81M is a micro-ATX board supporting fourth-generation Intel processors on a Socket 1150 H81 chipset. It has a pair of dual-channel DDR3 DIMM slots with a maximum capacity of 16GB at 1600MHz, Intel HD 4600 on-board graphics, 7.1 channel audio, two SATA3 6Gbps and two SATA2 3Gbps ports, with two USB 3.0 and four USB 2.0 ports.

Multi-GPU support is covered thanks to a pair of PCIe 2.0 16x slots, with one at 16x while the second, when occupied, works in 4x mode. There are also a couple of legacy PCI slots set between the two PCIe slots.

Being micro-ATX means there's limited space across the board for multiple graphics cards, and while you can easily fit a couple of large GPUs in there, you'll end up losing access to the legacy PCI slots.

On the other hand, since it's a smaller motherboard, the H81M does become a little more flexible in its uses. For example, you could easily make a mini gaming,



▲ For a mere £25 more, you can have a far better board

living room PC, with enough power available for an all-encompassing media system. Likewise there's no reason why this board can't find a place inside a bigger case.

It does have solid caps, access to the ASRock cloud, Wake on LAN and the ASRock XFast55 feature – which is said to boost performance. So while you may lack many

Of course, the question still lies: is this £50 motherboard actually worth spending any money on? In some respects it is. There's SLI and CrossFire support, and it's small enough for a power media centre too. But let's not forget the MSI Z97M from this group, another smaller micro-ATX motherboard that's roughly the same size as the ASRock H81M and that boasts better features for a mere £25 more.

In short, the ASRock H81M is a good motherboard, but it's not worth spending £50 on.

“ Is this £50 motherboard actually worth spending any money on? ”

However, due to the size and age of the board, there are naturally certain features that are absent. This board only takes half the memory the other boards on test can, and there's a lack of USB ports and PCIe 1x ports as well. Plus it doesn't have anything like M.2 or SATA Express, and if you really want to be picky, the H81M doesn't have the same kind of military class 4 components either.

elements the bigger, newer boards boast, there's still plenty to smile about with this example.

There's also one more feature that can sway users in favour of this board over the competition: the price. Although it lacks high-level technologies, the ASRock H81M comes in at just £50 or even a few pound lower if you take the time to shop around a little more.



ASRock Z97 Extreme6

DETAILS

- Price: £125
- Manufacturer: ASRock
- Website: goo.gl/MiOJgF
- Requirements: Fourth- and fifth-gen Intel CPU, DDR3 memory, storage etc.

While the ASRock Extreme9 is considered the better

motherboard in the range for supporting the Intel Z97 chipset, the lesser used Z97 Extreme6 has a lot going for it, and it can be found well within the group budget too.

The ASRock Z97 Extreme6 is an ATX board that supports Socket 1150 Intel Core i3, i5 and i7 processors. It has a single bank of four DDR3 DIMMs, with a maximum capacity of 32GB, and two M.2 connections, one of which is an Ultra M.2 connection.

The rear connectivity is good, with a single PS/2 mouse and keyboard port, HDMI, DisplayPort, optical S/PDIF out, eSATA and six USB 3.0 ports. Interestingly there are a pair of Intel gigabit Ethernet ports, which can work in tandem, as well as a five port audio block and a clear CMOS button.

Internally, the Z97 Extreme9 has two PCIe 3.0 x16 slots, a single PCIe 2.0 x16 slot, a pair of PCIe x1 slots and a single mini-PCI Express slot. Naturally, there's plenty of scope for a multi-GPU setup on the Extreme6, should you so wish.

Aside from the pair of M.2 connectors, the storage on the Z97 Extreme6 is actually quite good. You'll get ten



▲ There's plenty to like and loads of features too

“ The ASRock Z97 Extreme9 is a pretty good overall motherboard ”

SATA 6Gbps connections, including a single eSATA port and a single SATA Express connector.

The board is reasonably well laid out, with enough room between the PCIe slots for big graphics cards. The only problem you may come across is fitting multiple

graphics cards in with the M.2 slots filled, as it can be a little close depending on the GPUs you use.

We rather liked the blue and black theme used across the ASRock Z97 Extreme6. It may not be quite as dominating or as sports car looking as the MSI examples

in the group, but it's certainly effective enough and will undoubtedly look good in a well-planned system.

Overclocking and performance setups are handled well. The board features good all-round quality components and large aluminium heatsinks. Equally, there's some room for overclocking in the accompanying software, although it's not a main feature of the board, like it is with some of the other motherboards we've already looked at.

The ASRock Z97 Extreme9 is a pretty good overall motherboard and can be found for the price of £125 or thereabouts. It's a little lower in price compared to the Gigabyte Z97X and the MSI Z170A, and it does offer excellent M.2 connectivity.

Obviously, there's a lot going for this ASRock entry – enough that it can hold its own against the other motherboards on test that inhabit the more expensive end of the group budget. However, we feel the MSI Z97 board may have the edge in terms of performance and price.





MSI Z97M Gaming Motherboard

We feel this offer the best value for money, in terms of what technology you get from a motherboard and the features it supports. For just £110 (only £60 from the bottom of the budget), you get a huge amount of technology and features. and since it's micro-ATX it'll serve those after a powerful media centre and gaming PC.



ASRock Z97 Extreme6

Although priced toward the upper end of the group budget, the ASRock Z97 Extreme6 is a very impressive motherboard.

There's loads of support for more recent technology, and it's big enough to handle gaming or other high-performance work.

If you need something cheaper, though, don't discount the £75 Gigabyte Z97M-DS3H.

How We Tested

Each motherboard was tested with a collection of processors, mainly Intel Core i7s, along with a newer Skylake CPU, 8GB of DDR3 memory and an Intel SSD with Windows 10 installed. Where possible, we tested the multiple-GPU capabilities of a motherboard with a pair of Nvidia GTX970 graphics cards.

	Gigabyte Z97M-DS3H	MSI Z97M Gaming	MSI Z170A Gaming5	Gigabyte Z97X-SOC Force	ASRock H81M	ASRock Z97 Extreme6
Price	£75	£110	£130	£130	£50	£125
Cpu Supported	Fourth- and fifth-generation intel	Fourth- and fifth-generation intel	Sixth generation intel	Fourth- and fifth-generation intel	Fourth- and fifth-generation intel	Fourth- and fifth-generation intel
Form Factor	Micro-ATX	Micro-ATX	ATX	ATX	Micro-ATX	ATX
Socket Type	1150	1150	1151	1150	1150	1150
Chipset	Z97	Z97	Z170 Express	Z97 Express	H81	Z97
No PCIe x16 Slots	1	2	3	2	2	2
No PCIe x1 Slots	2	1	4	1	0	2
Legacy PCI	0	0	0	2	2	0
SATA Ports	6	6	6	6	4	6
M.2 Connectors	0	1	2	0	0	2

Your Letters

Support From The Internet - Not Manufacturers

It's interesting how support from manufacturers is being superseded by the internet and Google. After the recent upgrade to Marshmallow, I could not open my Nexus 7 to add files. After five minutes on Google, a fix was found and it worked.

But another problem shows how savvy users actually seem to know more than the manufacturers – in this case Hewlett Packard – and Microsoft. My HP Pavilion dv6 laptop simply won't upgrade to Windows 10. After two goes, I rang the helpline and Microsoft support said it should. We tried the direct download as opposed to the Windows update method. That too failed and the Microsoft advisor simply couldn't suggest any other solution.

Google is awash with problems with the dv6 and some posts suggest that HP drivers just don't work with Windows 10 and that HP will not be releasing updated drivers for my machine.

A recorded delivery note (always get complaint letters signed for!) to the CEO produced a dismissive

reply, but a second similar letter actually got me a phone call from the HP support team who assured me there was no problem with hardware or drivers, but third-party software might be the issue. Just restore the laptop to Windows 7 as originally supplied via the recovery partition and the upgrade would work.

Of course, it didn't! Windows 10 copied files, installed drivers (the first two stages), but when it tried to configure itself the screen just went black – like previous failures.

So I sent an email back to the HP support person I had been dealing with, and now I have a reply that says "the upgrade may not be possible at this time". It appears there really is a problem with the laptop; whether it's drivers or pre-installed software isn't clear. But the wider community knew there was a problem before HP did.

It will be interesting to see if HP actually does anything about it. So it looks like Windows 7 for the foreseeable future!

Bob Calver

Whose Paranoid?

A few weeks ago I rang my energy supplier to check if I was on the cheapest rate and what was their policy on smart meters. I was on the cheapest rate, said the operator, and they do not intend to roll out meters until 2020. Yesterday I commented on the said meters and my doubts over safety in a national paper. Today, I got an email from the aforementioned supplier advising to check my rate together, with an article praising the smart meter. Coincidence or what?

During my years with a computer, there have been two other incidents I found puzzling.

Once, a software program was hacked and a message left inside. Following an audio/video chat with a family member abroad. I found a word for word printed copy in My Documents.

Makes you think!

Rik

Windows 10

Hi. I have read loads about windows 10. It's free for first year and updates are compulsory? So will I have to start paying after first year? I need to know this before I update. If so, I will be moving to Linux Mint. like I think many more.

Malcolm McKechnie

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By email

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By post

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30 Cleveland Street
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Online

forum.micromart.co.uk



The Download Directory

James Hunt scours the internet for the best freeware, shareware and paid-for application releases

This month, The Download Directory's collection of offbeat and largely unexplored applications includes: CloneSpy, a program that helps you manage file duplicates and versioning; WinSnap, a screenshot application considerably more powerful than Windows' built-in tools; Nomad.net, a replacement file manager aimed at the technically minded, and CorzSpaZio, a simple disk-space monitoring utility with an ultra-configurable interface.

CloneSpy 3.22

Release Type: Freeware

Official Site: www.clonespy.com

Now that terabyte-sized hard drives are practically being given away free with the Sunday newspapers, running out of disk space is a thing of the past for most of us. However, on the off chance that you've got an SSD that needs a little trimming or a full external drive that you want to squeeze a little more life out of, maybe CloneSpy can help you.

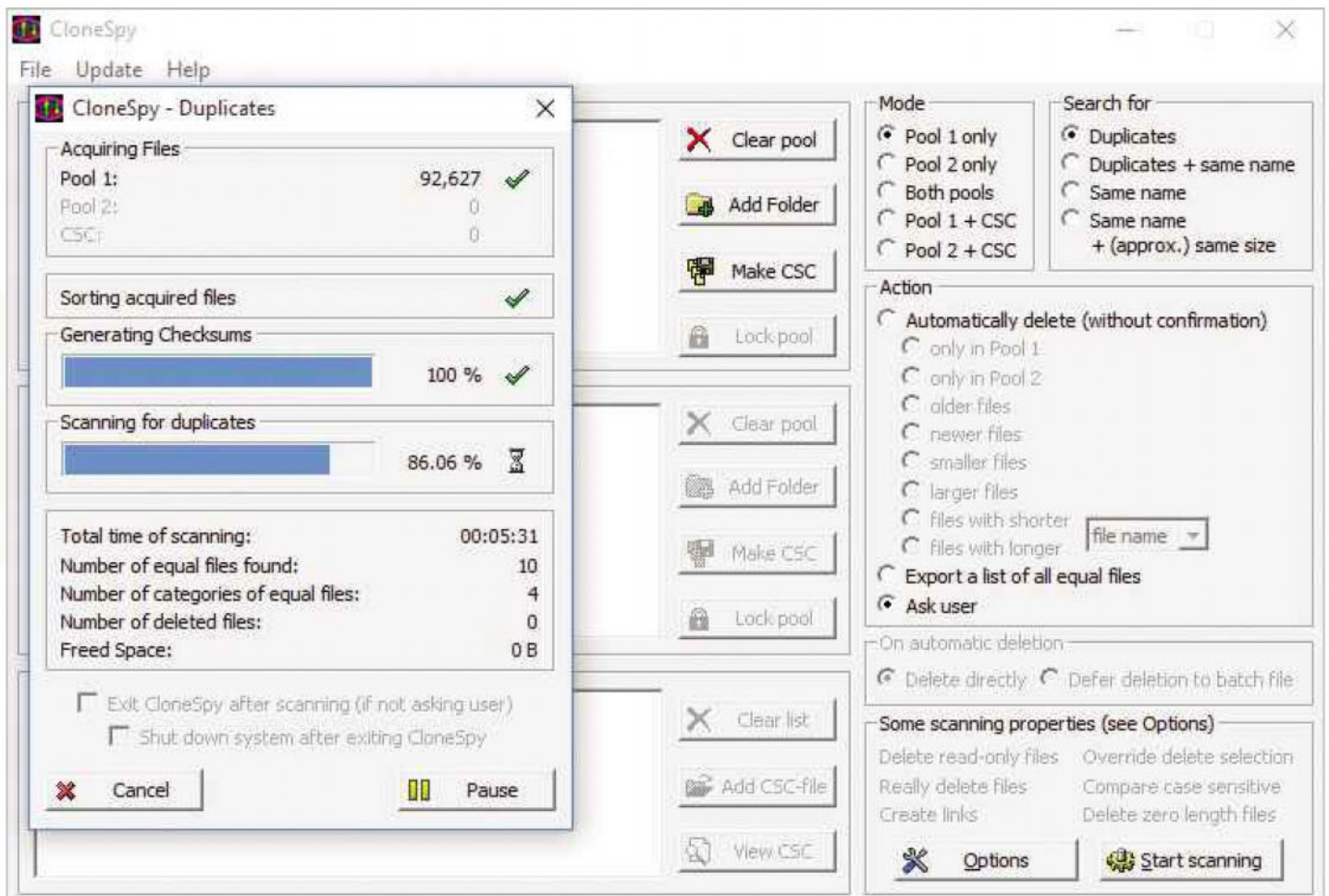
The irony is that now disks are bigger than ever, it's even easier to lose track of which files are the current versions, where you're supposed to be storing them, and whether two files are the same

or not. Fast Internet connections mean you can redownload something quicker than check whether you've got a local copy. That's why app-assisted organisation is the way to go.

CloneSpy is designed to help you with precisely that task, whether you're trying to free up hard drive space, or ensure that you don't end up with multiple versions of the same file. It's not the only app that does this job, but we've been looking for some time and we've yet to find the perfect one. So is this it?

Well, it has its good points. The comparison engine is excellent, and uses CRC checks to decide whether files are duplicates, regardless of filename, timestamp and location. It allows you to get rid of things you have more than one copy of with impressive universality. As an added bonus, it can also do the reverse, and flag up instances where files have the same filename but the contents are not identical, allowing you to merge them or discard one to create a single current version.

This feature can help you organise documents by (for example) deleting older revisions that are now out of date and unnecessary, or helping you clean out files you've downloaded more than once from different sources. It's a simple idea, but one that retains the spirit of



the program, and which is oddly absent from other, similar programs.

CloneSpy's impressive functionality is slightly let down, however, by a rather confusing interface. Worse still, its invented terminology can obscure the software's true intentions and simplicity. The main screen is clogged up with radio buttons and labels, and its talk of file 'pools' could quickly confuse novice users. In the best applications, you only have to look at the interface to know what to do and how to do it. CloneSpy, by comparison, will have you recoiling in horror. It's not a good thing at all (and don't even get us started on the grating, enabled-by-default sound alerts).

So while CloneSpy can impress thanks to several unique features and a bulletproof file comparison engine, the fact that it's so much more confusing to use than its rivals is bad news for its chances to taking the crown. CloneSpy is receiving regular updates – the latest version was released in August – so at least its active development means there's a chance for improvement.

Pros: Powerful engine

Cons: Interface is just too confusing

Rating: 3/5

WinSnap 4.5.6

Release Type: Shareware

Official Site: www.ntwind.com/software/winsnap.html

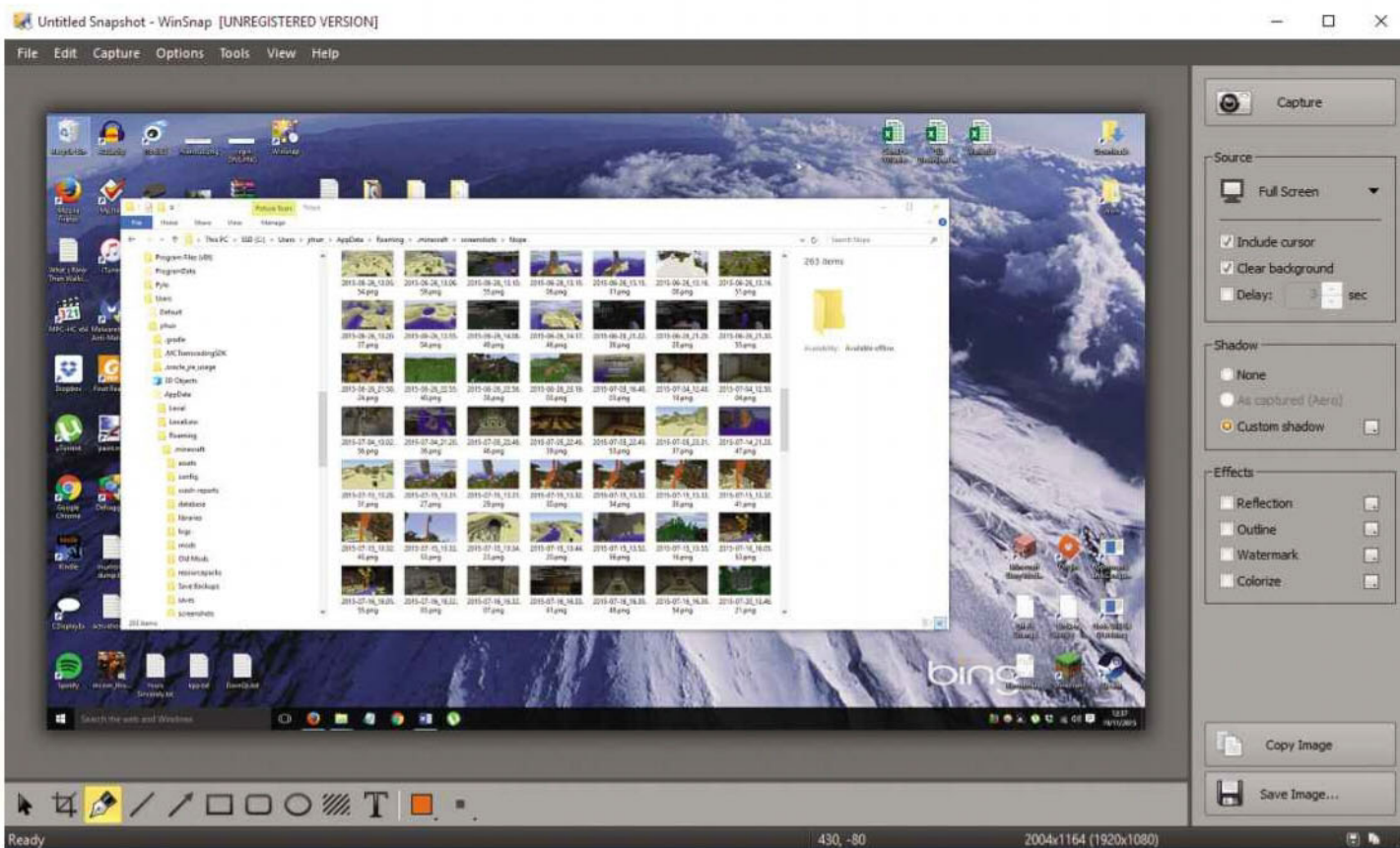
As you've probably noticed, Windows' ability to take screen captures can only be charitably described as 'limited', even taking into account the blessed relief that the Windows Snipping Tool has provided in recent versions. If you've ever yearned for a little more ease and flexibility when taking screenshots, then WinSnap might be the sort of program you're after.

WinSnap extends the screen-capturing capabilities of Windows to the point where they might even be considered useful in a practical situation. As well as offering configurable hotkeys to capture certain images, certain portions of the screen, or to assign to multiple clipboards, WinSnap also offers built-in colourisation and image manipulation effects. You can add contours and

“ **WinSnap extends the screen-capturing capabilities of Windows to the point where they might even be considered useful in a practical situation** ”

watermarks, or automatically rotate and scale images, all by pre-programming the hotkeys.

What truly elevates WinSnap above its competition is the level of detail and care taken in the software, though. When you create a drop shadow or capture a window, it specifically curves the effect around the edges of rounded interface edges, instead of blithely squaring them off. It's a tiny touch, but it's one that makes your images look far more professional. The software's Windows integration is fantastic in general, making full use of



the jump list so you can quickly access complex commands, and completely replacing the Windows screenshot functionality while the software is loaded.

It's these sorts of touches that help take the software from good to great, and they also go some way to compensating for the application's additional bulk, which appears in the form of filters with little obvious use beyond tinkering. It's hard to imagine anyone out there hoping to automatically capture their screen in sepia tone, for instance.

Despite this slight tendency to chuck in more features than you need, WinSnap is a very high-quality program, so you probably won't be surprised to hear that it's also shareware with a 30-day time out. If you do find it useful, you'll need to pay to keep using it beyond that period. The price of \$30 for a personal license isn't a particular bargain, but it's a cost mitigated by the fact that you get a lifetime registration with free upgrades. If you're looking for software in this category, there's no better example. If you take enough screenshots to make it worth downloading WinSnap, you probably take enough to make it worth paying for as well.

Pros: Super-powerful and with a great interface
Cons: Quite expensive initially (but still good value)
Rating: 5/5

Nomad.net 3.2.0.2745

Release Type: Freeware

Official Site: www.nomad-net.info

It's unusual, these days, to see people trying out other file managers for Windows. After all, the current version of Explorer pretty much caters for every need, and while people got rather upset over what they saw as Microsoft's browser monopoly, almost no-one ever complained that 3rd party file managers were being pushed out of the picture. There's a good reason for that, which is that no-one

Betawatch

To help you stay on the bleeding edge of software releases, Betawatch is a guide to the experimental and unfinished versions of some of the most popular applications around. Can't wait for new features? Now you don't have to!

Firefox 43 Beta

www.mozilla.org/en-US/firefox/43.0beta/releasesnotes

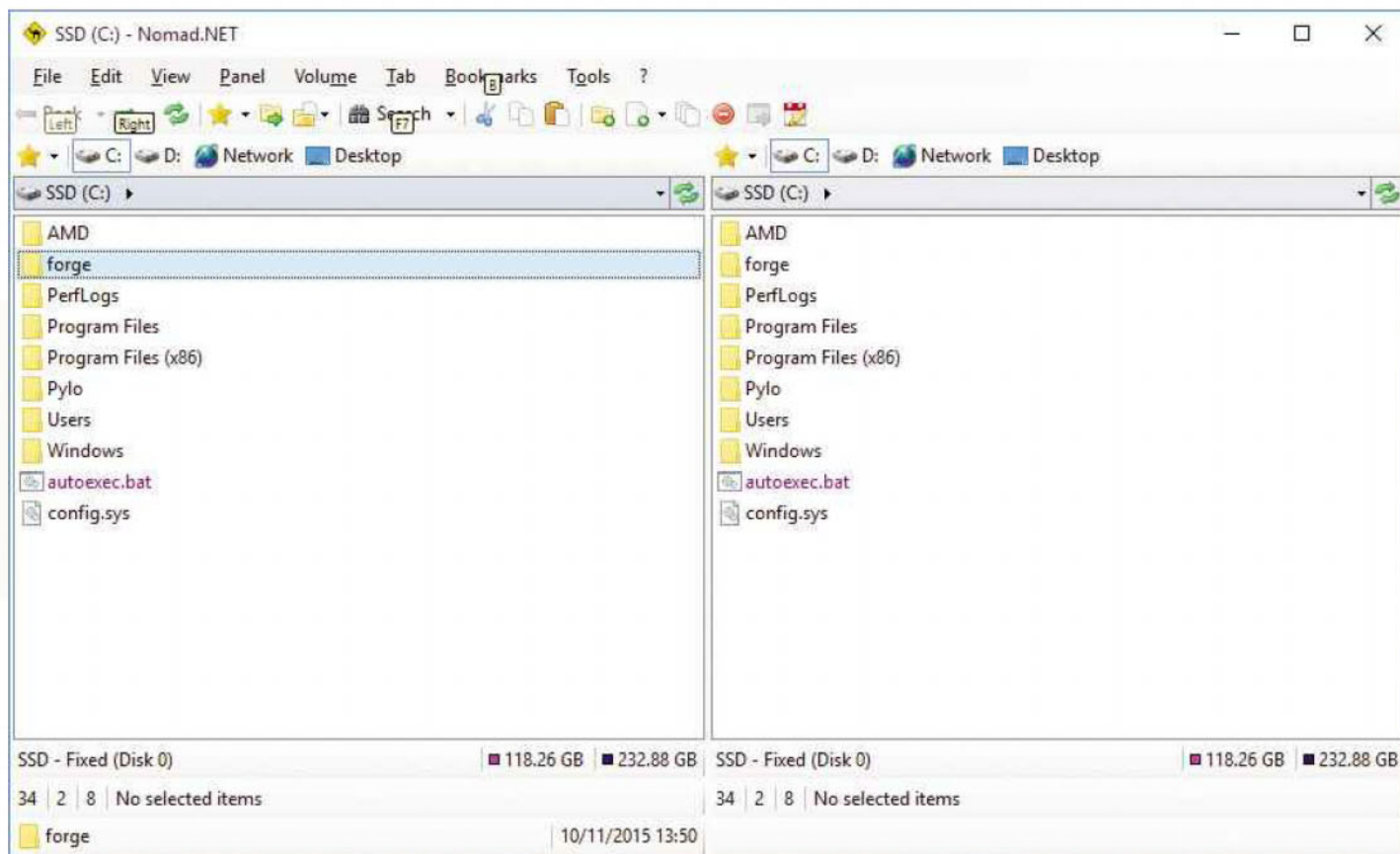
Released at the start of this month (just too late to appear in the last instalment, sadly) the latest beta version of Firefox, as ever, previews a number of new features coming in the near future.

Completely new features include an automatically enabled touch keyboard if you're using tablet mode or touchscreens in Windows 8 and Windows 10, improved API support for M4V video format, the ability to display search suggestions in the ruefully named 'Awesome Bar', and a user-selectable block list for Private Browser's Tracking Protection.

Developer mode has also added a huge number of new features. We won't list them all, but the new 'Use in Console' context item strikes us as potentially very useful, as does the animation inspector, which can show animations in a timeline.

And if anyone noticed the bug where the eyedropper tool failed to work properly when the page was zoomed in, there's good news for you: it's now fixed.

The latest beta is, as ever, available to download from the above URL, and if you switch to the beta channel permanently you'll have the latest version downloaded to your system as soon as it's available.



ReDownloaded

This month, in our regular retrospective section, we're looking back at the November 2013 instalment of Download Directory to see how the programs we reviewed have fared. Are they better? Worse? Gone completely? Here, we find out.

AppRemover

www.opswat.com

Reviewed: 3.1.10.1, Current Version: N/A

It's rare we see software that's officially discontinued – it's usually abandoned or simply gone – but AppRemover has been folded into OPSWAT's cloud-based PC management suite, Gears. It's a shame, because AppRemover was a pretty good tool for removing Malware. However, at the same time it is still possible to download the previous version (which has compatibility with Windows 7 and up) so it's not like you can't try it out if you really want to give it a go. Still, if you're after something to clean up the remnants of malware programs like AppRemover used to, it might be worth giving Gears a try.

Unchecky

unchecky.com

Reviewed: 0.2.1, Current Version: 0.4.1

Unchecky is an odd little program designed to prevent you from accidentally installing optional toolbars and adware by automatically unchecking any tickboxes which are presented to you as opt-out, rather than opt-in. It's an interesting idea and development has been

consistent even if the version numbers are racking up slowly (there have been 7 updates this year alone). If you find yourself the victim of unwanted installations a lot, it's probably worth trying out!

Maxthon Portable

www.maxthon.com

Reviewed: 4.2.1.1000, Current Version: 4.4.8.1000

Maxthon is a free alternative web browser that aims to include features not seen in the big three, or other offerings on the market. While we like that it supports two rendering engines, the software itself still doesn't implement features as precisely as it needs to. It used to be notable for having a Windows Phone app, but even that's quite common these days. It's still being updated, but the poor quality of the website – it didn't work with our version of Firefox, for example – doesn't really inspire confidence in the product.

iDisplay

getidisplay.com

Reviewed: 2.4.2.16, Current Version: 2.5.0.12 Beta

iDisplay was a great piece of software for allowing your iPad or Google Tablet to act as a second screen. The app was great, but the lack of Windows 8 support was a problem. These days it supports Windows 8 in beta, but, er... we're using Windows 10. While they're similar enough that it should work fine, the fact that its developers haven't actually updated iDisplay's website to say whether it does or doesn't says a lot about their priorities. A shame.

really wants to use a new file manager when the current one has been engineered and refined over countless versions of Windows to make every task about as simple as humanly possible.

Is there anyone out there who wants to throw that away and learn how to use a new file manager? The makers of Nomad are hoping that the answer to that question is 'yes', because they've updated their rival file-organiser in the hope of snagging some new users. The release candidate version is out now, and after some testing, it reveals itself as a remarkably useable effort.

Retaining the basic two-pane look of Windows Explorer, Nomad.net does add support for browser-style tabs, though the main way Nomad distinguishes itself is by being massively configurable. It allows you to change everything from folder appearances to tooltip behaviour. There's also support for plug-ins, which is particularly useful if you want to add support for non-standard filetypes and behaviours.

The real jewel in the crown of Nomad, though, is the incredibly powerful search function, which gives you access to complex search rules including filters, encoding formats and regular expressions. Windows 10's omniseach is great, but the mixture of webpages, apps, files and installed programs can slow things down. Nomad.net doesn't have that problem.

Despite this, however, Nomad's features aren't quite essential enough. You can imagine it becoming a niche choice for a niche audience, but features like full Unicode support really won't excite the average user. FTP support is a good idea considering how wonky Windows' own is, but at the same time, how necessary is it in 2015? Not very, we'd wager.

One of the more intriguing options Nomad.net supports is its command line interface, but there's not a lot of hand-holding available for that. If you're the sort of person used to Linux (or even DOS) then you'll know the speed and power a decent text interface can offer users who learn their commands, so it'd be nice if Nomad.net placed a little more focus on that rather than the GUI side of things. We're sure there are opportunities going unexplored.

Ultimately, while there are things about Nomad.net that are impressive, we're not sure there's enough about it to really count as a reason to jump ship to it. The features that do exist aren't enough to tempt users away from their comfort zones, and when your program is this far off the beaten track that's kind of a necessity.

Pros: Super-configurable

Cons: Technically impressive, rather than brilliant.

Rating: 4/5

CorzSpaZio 1.3.1.0

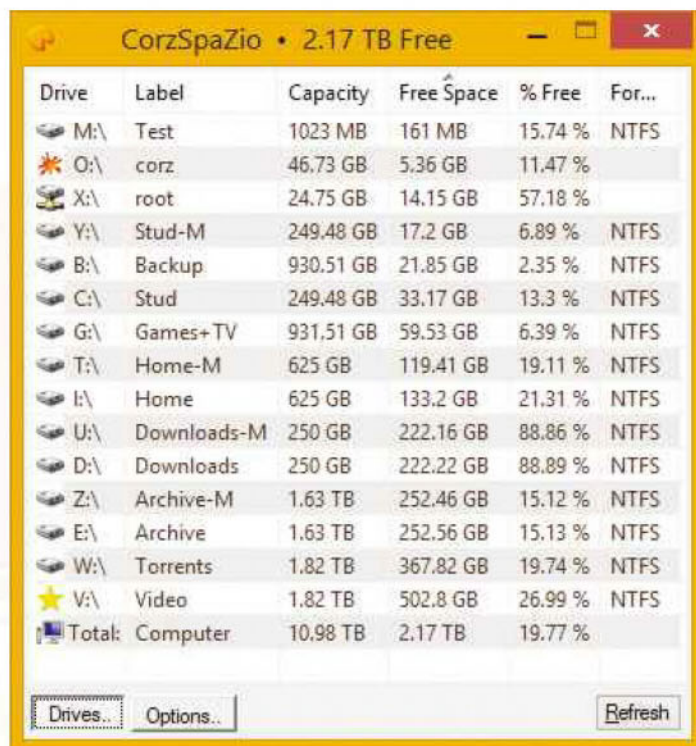
Release Type: Freeware

Official Site: corz.org/windows/software/corzspazio

CorzSpaZio is a program designed to let you know, at-a-glance, exactly how much free space is left on your storage media, whether it's local or detachable. As we discussed earlier in this piece, SSDs and external drives are particularly prone to filling up, so keeping track of storage capacities and disk usage before they become a problem is essential to make sure you don't have trouble saving or moving data around.

The program displays information about all fixed disks, whether they're internal, removable, optical or networked. Even RAM disks are included. It doesn't continuously prod the devices disks for updates, so you can leave the software running in the system tray without fear of any major performance impacts.

The program is incredibly simple, with a list of storage media and their space constraints calculated each time you launch or refresh the program. It's possible to sort and filter the data depending on its attributes, and you can easily view the totals across multiple disks as well as for each individual one. Features



The screenshot shows the CorzSpaZio application window with a yellow title bar. The window displays a table of disk space information for various drives. The table has columns for Drive, Label, Capacity, Free Space, % Free, and File System. The drives listed include M:\ (Test), O:\ (corz), X:\ (root), Y:\ (Stud-M), B:\ (Backup), C:\ (Stud), G:\ (Games+TV), T:\ (Home-M), I:\ (Home), U:\ (Downloads-M), D:\ (Downloads), Z:\ (Archive-M), E:\ (Archive), W:\ (Torrents), and V:\ (Video). A 'Total: Computer' row at the bottom shows a total capacity of 10.98 TB and 2.17 TB of free space. The window also includes 'Drives...' and 'Options...' buttons at the bottom left and a 'Refresh' button at the bottom right.

Drive	Label	Capacity	Free Space	% Free	For...
M:\	Test	1023 MB	161 MB	15.74 %	NTFS
O:\	corz	46.73 GB	5.36 GB	11.47 %	
X:\	root	24.75 GB	14.15 GB	57.18 %	
Y:\	Stud-M	249.48 GB	17.2 GB	6.89 %	NTFS
B:\	Backup	930.51 GB	21.85 GB	2.35 %	NTFS
C:\	Stud	249.48 GB	33.17 GB	13.3 %	NTFS
G:\	Games+TV	931.51 GB	59.53 GB	6.39 %	NTFS
T:\	Home-M	625 GB	119.41 GB	19.11 %	NTFS
I:\	Home	625 GB	133.2 GB	21.31 %	NTFS
U:\	Downloads-M	250 GB	222.16 GB	88.86 %	NTFS
D:\	Downloads	250 GB	222.22 GB	88.89 %	NTFS
Z:\	Archive-M	1.63 TB	252.46 GB	15.12 %	NTFS
E:\	Archive	1.63 TB	252.56 GB	15.13 %	NTFS
W:\	Torrents	1.82 TB	367.82 GB	19.74 %	NTFS
V:\	Video	1.82 TB	502.8 GB	26.99 %	NTFS
Total: Computer		10.98 TB	2.17 TB	19.77 %	

include the ability to display disk space information in the tooltip for easy access, a fully customisable list of disks, automatic low-space checking with optional alerts (tailored by volume and with user-defined thresholds) – even email alerts in case you're working remotely.

If you're trying to clean your disks out there are a number of options you can use to quickly clear out space-hogging files, such as emptying the recycle bin from within the app or clearing temporary files. It's not the most revolutionary idea, but it's appreciated nonetheless.

There's barely an option in the program that isn't customisable, and while it maybe goes a little too far for all except the most hardcore to care (do we really need a font option for each drive on top of every other option?) it's not like those options get in the way, buried as they are. It's perhaps most useful for people who have a large number of drives to administer, but even if you have just one or two there's value in getting your information in one place at a single click, instead of buried in the control panels like Windows' own version of this tool.

The program is also portable – a quality we think applies to all of the best tools around – so that's good too. Indeed, it's so portable that you can run it off virtually any form of media, even without write access. It's even possible to run two different versions with two different setups.

If we had to complain about anything, it's that the CorzSpaZio developer perhaps spent a little more time on customisation than potentially useful features. We'd like to see deeper analysis available, perhaps information about major space reductions when they happen (in case your computer's downloading temporary files without your knowledge, for instance) but there's nothing quite like that in here. It's the best at what it does, but what it does isn't very broad.

Still, you can't fault its comprehensiveness other than that. If only all programs had this much care poured into them.

Pros: The absolute best there is at monitoring disk space

Cons: We'd like to see more features

Rating: 4/5 mm

Remembering... Chuckie Egg

David Hayward recalls one of the few games he's actually quite good at

For many gamers of a certain age, the defining ZX Spectrum title was *Manic Miner*, but for others, me included, it was *Chuckie Egg*.

Chuckie Egg is a classic example of how something as simple as running and jumping around a many-platformed screen can highly addictive. Although remarkably limited in its delivery, *Chuckie Egg* proves that a game doesn't necessarily need to have the latest, most dazzling 3D graphical effects or studio-quality audio.

Indeed, this is a game that takes pride and place among the many classics in the 8-bit version of Valhalla. A veritable masterpiece that deserves more credit than it first received at the hands of the 1984 reviewers.

Conceived and programmed by Nigel Alderton, who went on to create such notable titles as *Commando*, *Ghosts 'n Goblins* and *Kong Strikes Back*, *Chuckie Egg* has you playing the role of Hen House Harry, who must collect the eggs and piles of bird seed before the time runs out (incidentally, the bird seed pauses the countdown for a short period).

Before him lies a problem, though. The hens (or ostriches, depending on your point of view) naturally don't want to give up the eggs, so they'll wander the many platforms of the hen house in an effort to protect their yolk-bound potential offspring. Contact with a hen results in loss of one of Harry's five lives, as does mistiming a jump from one platform to another, plunging you into an abyss. Also, if you take too long, then the giant Mother

Duck housed in the cage in the top left of the screen will escape and chase after you.

Its History

Alderton was in his mid-teens at the time, around 1982/3, and working a Saturday job at A&F – fetching tea for the developers, duplicating tapes and so on.

Having already cut his programming teeth on a ZX81, the young Nigel asked the programmers at A&F if they wouldn't mind taking a look at the game he was working on. Rather bemused, according to Alderton, they gave an early revision of 'Eggy Kong' a once over and were hooked.

Chuckie Egg, as it was later named by A&F, was originally based on the old arcade game *Space Panic*, with elements of *Donkey Kong* thrown in along with numerous other inspirations. Alderton made the game to test the player's reaction skills, with a fast-paced level that needed keen reflexes and timing rather than the more thoughtful concepts that were around at that time.

With the Spectrum version nearing completion, fellow A&F developer Doug Anderson worked on the BBC Micro version – a version that differed slightly in a number of ways. The overall success of *Chuckie Egg* on both platforms meant that different versions could be readied for conversion.

After over one million sales, A&F looked to a sequel, but by then Alderton had moved on to work for Ocean, and *Chuckie Egg 2* never really lived up to the standard of its predecessor.

Did You Know?

- The game is never ending, looping the screen at level 40.
- The timer does decrease from level 48 onward.
- The main character, Hen House Harry, was nameless until, according to Alderton, "the bloke who wrote the blurb for the inlays" named him.
- A&F went bust in 1985, but reappeared as MC Lothlorien, then Icon Design and Tudor World, before disappearing completely in 1991.

The Good

Amazing gameplay, considering it's such a simple game. A test of the gamer's timing and reflexes. That noise when you run and jump.

The Bad

Timing those lifts correctly. Running out of time and having the hen in the cage come and get you.

Conclusion

One of my favourite Spectrum games of all time, *Chuckie Egg* is one that I still play to this day and is also one of the only remaining games that I can actually beat my 15-year old son and 13-year old daughter at.

Thank you, Nigel Alderton, wherever you are.



▲ Level 1: guide Hen House Harry on his never ending search for eggs and seeds



▲ Things get progressively more difficult as you move on, and timing is essential



▲ Oh the lifts, how we hated the lifts

RETRO ROUND-UP

Dave Edward is overwhelmed by the excess of absolutely free retro games this Christmas

Welcome to this December's Retro Round Up, where I look at a handful of the games (and these days it really can be no more than a handful of them!) produced by what I would call 'cottage industries that are apparently in permanent snowball effect'. The growth of retro-gaming in the past few years has been breath-taking. Psytronik and Monument Microgames are selling out of new retro games within hours of making them available. And if you were in London recently, then you may well have caught a glance of the hysteria associated with retro games at the London Gaming Market (www.londongamingmarket.com), which took place on 15th November 2015 and was so well attended that many attendees reported being unable to even get near the stalls!

With a whopping new 35 games released for the Amstrad alone in November, even I am starting to wonder where this is all going to end, although in the interests of getting the article started, some of these are a good enough place to begin...

4 To 4: Back To The Future (Amstrad CPC 464, Kukulcan, Free, youtu.be/3kfU7w0Y8rQ)

Regular readers will remember that some months ago (MM1366), I reviewed a

Spectrum 128K block-bashing puzzle game with a very, ahem, 'memorable' title and a very tenuous connection to the movie *Titanic*. Presumably Kukulcan, the publisher of *4 To 4*, never saw that review, as it has made exactly the same mistake by suffixing its new Amstrad game with 'Back To The Future' and sprucing it up with a picture of Marty McFly on the loading screen. Fans of *Back to the Future* will doubtless be infuriated to find that there's no other connection to the famous movie at all, and they're simply faced with a puzzle game and one that isn't even a new idea.

4 To 4 is a 'square slider' game. We've seen a few of these on the Spectrum over recent months, each being variants of the same theme. An overhead maze is drawn on a screen-sized grid and some squares – in *4 To 4*, there are (unsurprisingly) four of them! – must be slid to their 'home' within the grid. Once you flick a square in any direction, it doesn't stop until it hits something. The skill of playing is in positioning the squares in such a way that you don't make the puzzle impossible.

4 To 4 comes with 50 levels, each featuring four squares. You can select the square you wish to move by choosing it with one of the number keys and then flicking it with an arrow key. There are two reasonably easy levels to begin with before the difficulty is seriously ramped up; just watch the YouTube video for what awaits

you even at level three! The background music is good (and there are three tunes to choose from) but too distracting during play. Fortunately, it can be turned off.

Such grid-based games don't really demand snazzy graphics. Those of *4 To 4* are functional, and the patterns easily distinguish the four different squares from each other.

4 To 4 is one of 35 new games that have arrived simultaneously on the Amstrad CPC 464 courtesy of the annual #CPCRetroRev tournament (see cpcretrodev.byterrealms.com/en for more). I'm not sure what I hoped for by picking it out of the box first; probably I hoped for an Amstrad conversion of Telltale Games' superb Xbox *Back To The Future* point-and-click adventure game! The sad thing about that is that if getting reviewers to look at it first was Kukulcan's intention in naming it in that way, then the plan worked. Well, sort of, because I may have come to it first because of its title, but I left it feeling I had been suckered into just playing another version of *Game About Squares*, so I'm not going to recommend it. So there!

More Than A Prison (Amstrad CPC 464, LTS Games Team A, Free)

The next of the Amstrad #CPCRetroRev games is *More Than A Prison*, a simple overhead maze game that looks like a magazine type-in from the early 80s. There are no real instructions; you take control of a prisoner in a maze featuring patrolling nasties, keys, doors and weird green blobs that home in on you once disturbed. It doesn't take Einstein's brain to deduce that you need to avoid everything that moves and collect the keys.

One key will open one door anywhere in the maze, so choose carefully, so you can unlock the doors that will lead you to the next screen.



▲ A new *Back To The Future* game for the Amstrad? Alas, no...



▲ ...just a version of *Game About Squares*. No connection to the movie at all!



▲ *More Than A Prison* looks like a magazine type-in from the early 80s



▲ *An incredibly difficult game too*

More Than A Prison doesn't have the frills of many of its bedfellows, launching straight into the game with no loading screen and having simple up, down, left and right controls. Unfortunately, positioning your prisoner is fiddly and, particularly when you're being chased by a green blob, you're quickly killed off. Death sends you all the way back to the very beginning, which is hardly encouraging. The music is pretty decent, however.

Space Moves (Amstrad CPC464, Toni Ramirez, Free)

If you're of a certain age, you'll probably recall Dinamic Software's *Navy Moves*. It was one of the very first Amstrad (and Spectrum and C64) games where the publisher had realistically animated the characters within it. You commenced *Navy Moves* by leaping a dinghy over some mines, then, in the second part, went on to infiltrate an enemy submarine where you got to torch mercenaries with flamethrowers.

Space Moves is clearly written as a homage to *Navy Moves* and is done in the

same style with the same type of realistic animation, status panel and menu screen. Unfortunately, it's a Spanish-only title, which means you might have to have one or two goes at redefining the keys. However, get it started and you'll find the dinghy mission has been replicated as truck leaping chasms. There are enemy trucks to blast out of the way too. It's very *Moon Buggy*-esque.

Alas, the playing area seems rather cramped; often there seems to be nano-seconds to spare between having to shoot an oncoming foe and land safely on a one-inch-wide chasm.

I'm not sure if there's a subsequent mission a la *Navy Moves*, as leaping the chasms is in fact pretty difficult and, after ten minutes or so, does become rather boring. To complete the mission, you need to survive for a certain length of time, denoted by the timer ticking down on the right.

Although there doesn't seem to be very much to it, the game is very colourful and very responsive and, because there are probably more than a smattering of *Navy Moves* fans reading this, certainly worth adding to the Amstrad list of games for them to play.



▲ Toni Ramirez's *Space Moves* is a homage to 80s Amstrad game *Navy Moves*...



▲ *The idea is to stay alive until the 1777 (right) ticks down to zero*

Scores (4 To 4: Back To The Future)

Graphics 8
Sound 8
Presentation 6
Overall 7

Scores (More Than A Prison)

Graphics 4
Sound 7
Presentation 3
Overall 5

Scores (Space Moves)

Graphics 7
Sound 7
Presentation 9
Overall 8

Balachor's Revenge (Spectrum 48K, Monument Microgames, £8, youtu.be/c7acDWfz4oA)

Balachor's Revenge follows on from the game *Catacombs Of Balachor*, an overhead maze jaunt in which you, a grave-robber, set out to loot the tombs of a sorcerer named Balachor. You succeeded, gave him a bit of a drubbing and, apparently, retired to the village of Greenbury with your ill-gotten gains to live it large.

However, he's none too happy about this, so he's cast a spell over your village, scattering the possessions of all those who live there. Now your task is to reunite the townsfolk with their possessions, find Balachor and kill him. Nice.

Balachor's Revenge has many of the elements of its prequel, with the walls of the overhead maze simply having been spruced up as castles, houses and jungle. A real difference, however, is that *Balachor's Revenge* is much more arcade adventure than the former game. The 'loot' (in the form of diamonds, crowns and precious stones) isn't intended, as it formerly was, simply to make you rich, but instead to be used to pay the 'seer', a character you will quickly chance upon and who gives you hints and tips on other



▲ *Balachor's Revenge – the demon's coming to get you*



▲ *Quite a few goodies to be had in this room*



▲ *The seer's knowledge can be bought with the loot you recover*

characters you should seek out (and what they might need).

Initial puzzles involve reuniting a wizard with his cauldron, cutting down a tree with an axe and finding three herbs for a beekeeper. While initially interesting, however, these 'missions' quickly become rather disappointing. The process of discovering the items and bringing them back to the correct character is rather a dull affair. It's hindered even further by the fact that you don't get any textual description of the items you see and pick up either. So you must determine whether that rectangular thing with a squiggle on it is the objective of the current mission, usually by trial and error.

There are some nice points about the game, though. It's presented well, and the graphics, although mostly monochrome, are fairly good. Ducking and diving around the various patrolling nasties is easily achieved because your man responds well to keypresses – and the many different characters and missions mean *Balachor's Revenge* can be played in a different order each time.

A feature that is particularly likeable is that you can carry three objects at any one time, and the correct one will be automatically 'used' if necessary (i.e. the axe will cut down the tree without you needing to select and use it).

For my troubles I have so far attained the rank of 15% and been adjudged a 'cowardly serf'.

Monument Microgames originally released *Balachor's Revenge* last year, but the print run of physical cassettes was limited to 50 and, as with Cray 5 last month, the game sold out within a few hours. Now a second print run is promised in the near future, with the game retailing at £8 including the usual high quality of packaging. To be first in the queue, make sure to 'Like' it on Facebook at www.facebook.com/MonumentMicrogames/t56tZN.

Popeye (Vic 20, Beamrider, Free, youtu.be/QkPJ7wXf0_w)

The Vic 20 doesn't get a great deal of new games, but Beamrider's conversion of the 1982 arcade machine *Popeye* is, for this format, a real blockbuster.

You play Popeye the Sailorman, and your mission is to win the heart of Ms, Olive Oyl who is at the top of the screen throwing out hearts for you to collect.

There are three stages of the game, set in turn on a dock, a street and a ship. All three are one-screen based platform ladders-and-levels type and feature you, Olive and Bluto. Bluto is

your rival for the affections of Ms Oyl and is out to stop you collecting your quota of hearts by bumping into you, throwing beer cans at you, grabbing your tootsies from the level below you or bonking you on the head from the level above you. Therefore, you want to give him as wide a berth as possible by making judicious use of the ladders.

You're not just pursued by Bluto either. There are Sea Hags, who appear on the extreme left or right of the screen, and a vulture, which sweeps down over the boat. You can deal with the Hags by avoiding them (and punching the beer cans they also throw) and the vulture by punching it.

Each stage has its common and its special features. Easily the best common feature is the spinach which, when you eat it, renders you invulnerable to Bluto for about 20 seconds. It's very satisfying to find him and send him flying, even if he does recover quite quickly. Other things you can do include dropping a barrel on Bluto's head (scene one), touching the bottom of Sweetpea (scene two) and riding the moving platforms (scene three).

Clearly writing something as accomplished as *Popeye* for the humble Vic 20 is no mean feat, and Beamrider has taken the approach of trying to drop almost nothing of the original. In that,



▲ *The arcade hit comes to the Vic 20*



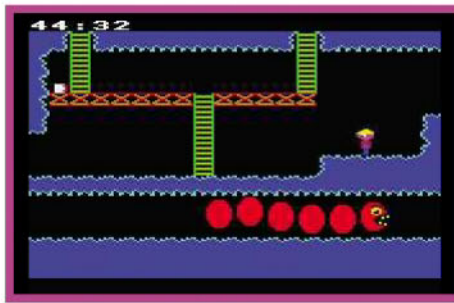
▲ *Goodness me. Which one's Popeye?! Answers on a postcard please*



▲ *Dumping a barrel on Bluto's head. Awesome*



▲ *Hard Hat Harry is back!*



▲ *The roaming viper is not to be tangled with...*



▲ *The familiar cup of tea and spanner-throwing monkeys are back too!*

it has succeeded, in that this conversion requires all of the original's dexterity and retains all of its manic, and very addictive, qualities.

It also retains all of the original's wonderful little quirks, score bonuses and cartoony features. That's not to say, however, that this format doesn't have some rather obvious problems.

The biggest one is the resolution of the graphics. Look at the screenshots and you'll see it's pretty difficult to pick out who's who. Admittedly, that's only a problem the first few times you play, but more vexing is that you need to seriously squint sometimes to see the flying beer cans against the backgrounds.

There's another problem too, which is that Beamrider clearly thinks *Popeye* for the Vic 20 is only going to be of interest to players familiar with the arcade original, and so doesn't provide any instructions for it! As I've explained, the game has fairly complicated features, and the three scenes include both friendly and unfriendly characters. Some people are doubtless going to download *Popeye* and simply not have a clue what to do!

Those minor points aside, *Popeye* is great, and this new Vic 20 conversion of it couldn't be better. It even includes the theme music and a host of fun sound effects. It can be downloaded from goo.gl/MZGNT9.

Hard Hat Harry 2: Son Of Harry (Retro Software, Free, youtu.be/38T_xEUoPk4)

Hard Hat Harry was last seen avoiding gorillas, birds, monkeys and flying spanners in the game of the same name – and he's now back to do more of the same in *Hard Hat Harry 2: Son Of Harry*.

As with the evolution of *Manic Miner* into *Jet Set Willy*, author Tom Walker has, for this sequel, progressed his game

mechanics from a selection of screens to be completed serially to a map of caverns, which can be wandered according to your own whim. It retains much of the 'feel' of the original, while introducing some new touches. There are the same cups of tea to collect as in the first game; there are new enemies in the form of penguins and the 'hyper viper'; and there are new puzzle elements. The latter include switches that can be pulled and pushed, and a radioactive boulder that can be used to deal with the viper.

The viper is a particularly terrifying menace, because if it collides with you in certain locations, it will do untold damage. Unlike the first game, which had a lives system, this one has a timer that is counting down to when the caverns will explode. If you collide with any animal, the timer is reduced, presumably because you've been knocked unconscious for a short time as a result. You're then returned to the point of the screen at which you entered. The viper is a peculiarity in that it roams from room to room while the other animals do not. This means you can be unlucky enough to recover just as it enters the room for a second time, leading to a fast obliteration of time remaining.

As with the first game, you run left and right and climb and descend the ladders to make progress. The odd choice of the first game's cyan backgrounds are also sensibly corrected to black for this sequel. This makes it a little easier to jump projectiles, but it's definitely not easy and requires practise.

The aim of the game is to collect the cups of tea and escape the caverns in which Harry is trapped. As the instructions don't state as much, I consider them best left unread.

And Finally...

What is it with retro game publishers? This month we've seen at least half the games

Scores (Balachor's Revenge)

Graphics 7

Sound 3

Presentation 10

Overall 7

Scores (Popeye)

Graphics 4

Sound 7

Presentation 10

Overall 7

Scores (Hard Hat Harry 2)

Graphics 8

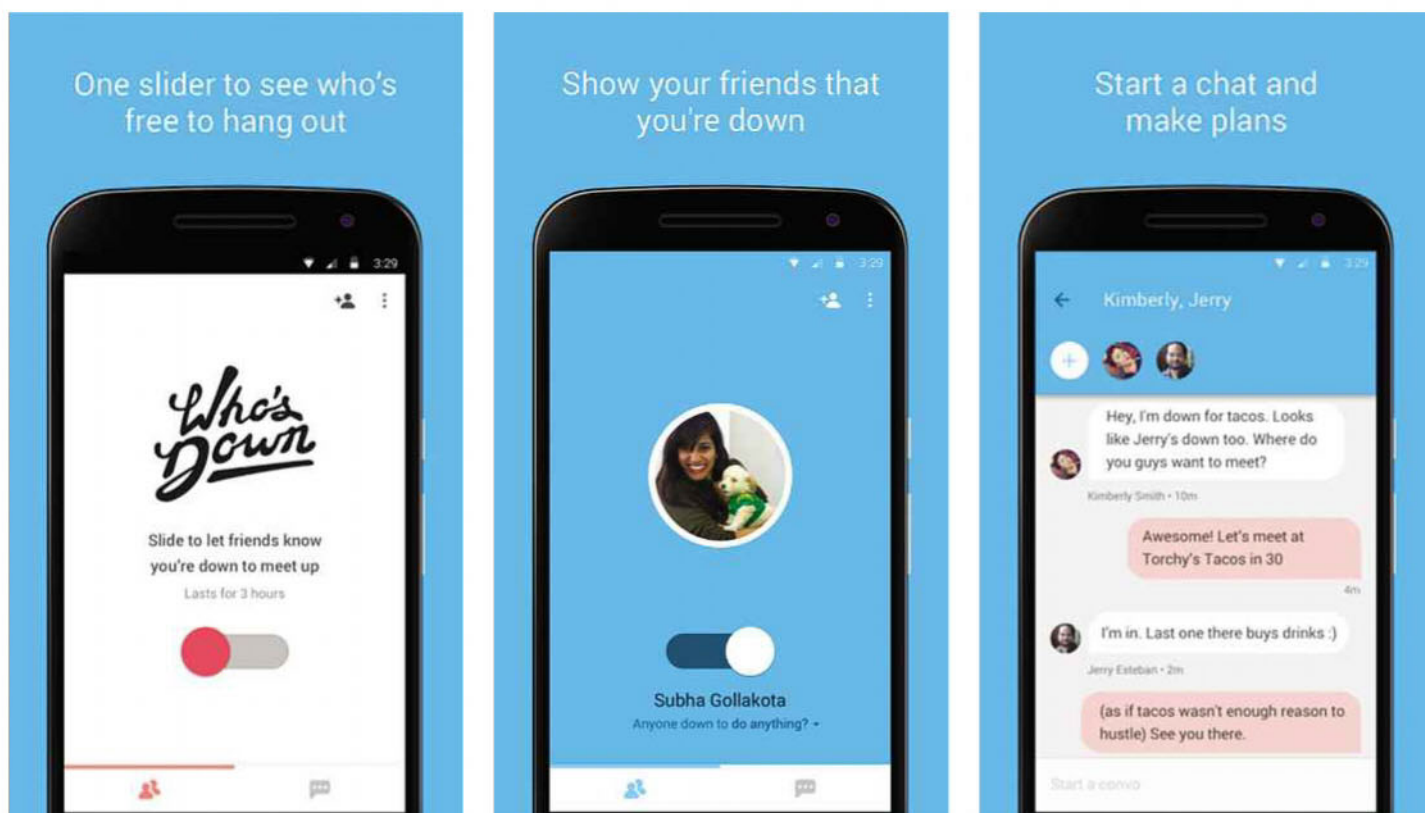
Sound 4

Presentation 8

Overall 7

reviewed come without any instructions on how to play them! Indeed, sometimes you find the game itself on a forum post, the instructions on a wiki and the discussion on a forum/YouTube comment thread! What's needed is a single page where I can send all of you – one which shows you the game, how to play it, the video review and where you can click to either buy it or get the download, right?

That shouldn't be too much to ask and, not being one to rest on my laurels, I have created such a site. So next month, pending a quick bit of QA, I should be able to redirect you to a single link for each game, rather than a whole host of them. Watch this space... [mm](#)



What's Up With Who's Down?

Sarah Dobbs looks into Google's latest foray into social apps

Trying to make plans with almost anyone seems like an exercise in frustration nowadays. We're all getting busier and busier, to the point where you need to give several weeks' notice just to arrange to grab a pint after work with your best friend. If you find yourself with a couple of hours free one evening, finding someone to spend it with seems like a Herculean task, even if you and all your friends live in the same town. There must be a better way, right?

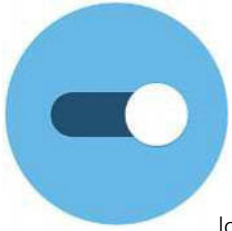
Well, Google might have the answer. In a not-much-trumpeted move, the tech giant has dropped a new app into both the Play store and the App Store. Called Who's Down, it's currently in closed beta, meaning you have to apply for an invitation to join. Clearly my invitation has been lost in the

post, but let's not let that stop us from poking at it to find out more...

Who's Down?

From the screencaps on the app page, Who's Down looks to be a pretty simple interface. You add your friends, and then when you fancy hanging out, you slide the toggle button to show that you're 'down' (i.e. available). You can add tags to suggest activities or scroll through your list of friends to see who else is up for a trip to the cinema/fancies going for tacos/wants to go for a quick drink.

There's a messaging service built in too, so you can make solid plans with whoever you want to see. It's tidy, straightforward, and potentially pretty useful. If you try to get access to the app



at the moment, it asks you what school you go to, so it seems like Google's aiming this squarely at students; that makes sense, since that's probably the time in most people's lives when they have the highest number of local friends and large chunks of free time. Like

Facebook, though, there's no reason it couldn't be opened up to everyone after its initial launch.

Will It Catch On?

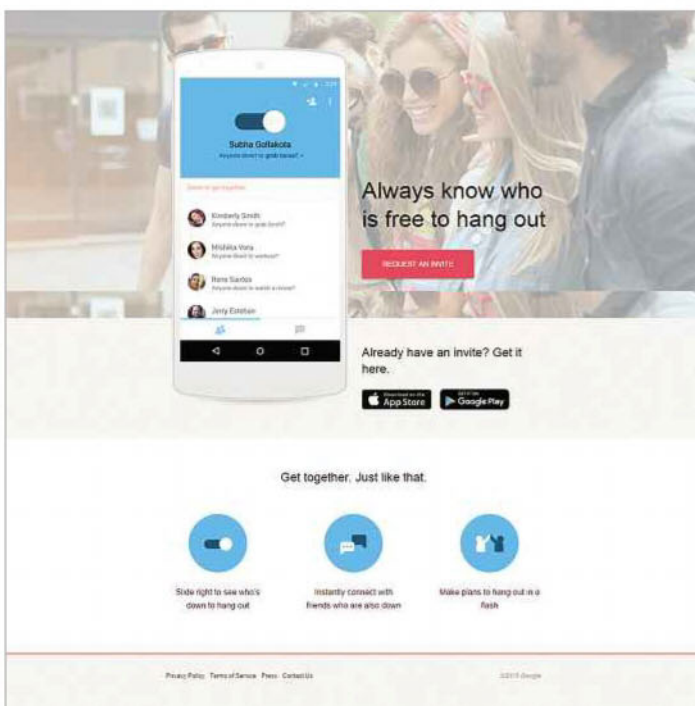
Trying to predict an app's future before it's even been made available to more than a handful of people is obviously tricky. But although Google has a long and storied history of launching and then shutting down unloved social apps, this one seems like it might be a goer.

Unlike Wave or Plus, it's not trying to muscle in on a market that's already been well served by other services; friend groups might use Facebook or maybe WhatsApp groups to post similar 'I'm bored, anyone wanna do something?' type messages, but there isn't another app geared to that specific function, so Who's Down might well capture it.

And unlike Buzz or Latitude, it doesn't have any glaringly obvious privacy concerns. It doesn't ask users to post their location to the web, and it doesn't push users into oversharing their info; all it asks, really, is for a toggle to be pushed from a 'no' to a 'yes' position.

If you squint, you can see how there might be some potential for awkwardness there: if you've felt obliged to add your entire social circle to the app, for example, you might struggle to find an excuse not to socialise with someone you don't really like if you've already indicated to the world at large that you're 'down' to hang out, but maybe there'll be filters for dodging people you're not really available to? (Or maybe, like when a Twitter 'glitch' unfollows people, we'll all just make up excuses that blame the technology.)

I'm definitely down for trying it out, Google, whenever you're ready. **mm**



Google's Unfortunate History Of Social Apps

Google doesn't exactly have a great track record when it comes to launching social apps people actually want to use. Here are the ones that came before:

Orkut (2004 – 2014)

Named after Google engineer Orkut Büyükkökten, Orkut was a MySpace-style social networking site with the USP that it let users rate one another for various personality traits (like 'cool' and 'trustworthy'). Although it wasn't particularly big over here, Orkut was massive in India and Brazil. Google pulled the plug last year, having decided it would rather focus on YouTube, Blogger and Google+ instead.

Google Lively (2008 – 2008)

Google's take on Second Life, Lively, never even made it out of beta before getting shut down. Created by Niniane Wang, it was a kind of system of 3D virtual rooms, in which up to 20 users could chat. The idea was that Lively rooms would be embedded in websites, so visitors could get a sense of what the site's community was like, but within four and a half months, Google had decided it wasn't working out.

Google Wave (2009 – 2010)

Wave wasn't exactly a social networking site, but it was close. It was a messaging platform, where messages ('blips') were stored on a central server rather than on a user's device, and where people could be added to or removed from conversations at any time. Google reckoned it could replace email, but the rest of the world didn't agree. Wave still sort of survives, as a project by the Apache Software Foundation, but Google's given up on it.

Google Latitude (2009 – 2013)

After acquiring and shutting down location-based social service Dodgeball, Google launched Latitude, a kind of social add-on to Google Maps. The idea was that users would broadcast their location using their smartphones and be able to see on a map where their nearest friends were. Although it was opt-in, and Google promised it wasn't keeping a record of where users were, it just didn't seem to appeal to many people.

Google Buzz (2010 – 2011)

A kind of microblogging/aggregating service, Buzz was supposed to be integrated with various other services, including Flickr, YouTube, Google Reader and Twitter. Criticised from almost the moment it launched for its lackadaisical approach to privacy, Buzz was another shortlived venture.

Google Plus (2011 – present)

Google's answer to Facebook, Google+ is still around, but it seems to have failed to take off. Although it has a massive user base – because if you've got a Google account, you're constantly being encouraged to sign in! – analysis has shown that only 6.7 million users have more than 50 posts on Google+, which suggests most people give up pretty quickly.

The Writer's Tale

Mark Pickavance talks about his long association with Micro Mart and how it's changed over the decades

The phrase 'May you live in interesting times' perfectly sums up what being a technology writer has been about since Micro Mart first hit the stands in 1985. The unprecedented level of change we've all experienced since then has affected everyone's lives, sometimes in the most unexpected ways.

But having travelled along what has been occasionally a bumpy road, I'm drawn to another philosophical perspective: that's it's been more about the journey than the actual destination.

Words Aplenty

That resonating whine you can hear, that's the sound of my English teacher rotating at turbine velocity in his grave at the very suggestion that I'm a writer of any kind. Obviously, that's not true, not even remotely. I use words with all the precision and aplomb of a 52 Bomber tactically re-landscaping the Ho Chi Minh trail. To paraphrase the legendary Eric Morecambe, they were all the right words, just not necessarily in the right order.

In my defence, I'd like state that I never actually set out to be a journalist at any point and have no delusions about the disconnection that exists between the ideas in my head and how they end up on the page.

In the early days I eviscerated the English language for Future Publishing on such long forgotten tomes as ST and Amiga Format, along with other oddities like 3D World. Joe Lavery,



a long-time friend and another *Micro Mart* alumnus, then encouraged me to contribute to this hallowed publication.

Curiously, I'd already appeared in the pages beforehand, when my efforts creating a game for EA were covered in issue 122. That, by my rough calculations, was in August 1990, and probably my first connection with the mag. To this day, that is the one of the very few times that a picture of me has appeared in print, and thankfully it didn't cause a massive irreversible decline in sales.

The first review of mine published in *Micro Mart* was in 1993, when I reviewed *Megarace* by Software Toolworks, and at the time we didn't actually provide a score. I know all this because at the time I used to clip and keep all my published pieces, and that one I saved. I've since published more than seven million words, and those types of vanities are a distant memory.

Micro Mart was already a weekly magazine at this point, having initially been a fortnightly, but with the exception of the cover, it was printed entirely in black and white.

But it wasn't just the mag that looked like a snapshot of the past. Everything about its production then was hand cranked in a way that anyone working on it today would really be truly disturbed by.

The Pre-internet Micro Mart

When I first started writing for the mag, all the written 'copy' was actually sent through the mail on floppy discs, because CD writers had yet to become commonplace. Things got lost, arrived but couldn't be read, weren't an acceptable format, messed up the typesetting system and so on. In short, it was chaos.

Almost every aspect of getting the mag to print was old school, imparting a flavour of the industrial revolution and not the silicon one.

At the time, *Micro Mart* was part the Trinity Mirror group, and the offices were in Birmingham, so any work I did for it needed to be sent there before it could be incorporated into the mag.

Many people will assume, having seen too many TV shows about publishing houses, that it was a big open plan office with people shouting 'Hold the press!' whenever a big news story broke. Nothing could be further from the truth, other than it was an open plan office, and it was occupied by easily excitable people.

They were generally involved in the process of turning the submitted words into pages, using desktop publishing tools usually running on Apple Macintosh computers. Other staff there sold advertising and rang writers to ask where that feature they'd promised might be hiding.

The writers, for the most part, were never allowed anywhere near, unless they'd mucked up so badly that they had to take a train and bring their copy to the office in person. That never happened to me, but it happened.

Most of the contributors were freelance, and the vast majority had other full-time occupations, making writing more of a hobby. I was an IT manager, Joe Lavery ran his own retail business, others were teachers and academics, but almost none of them had ever trained as a journalist or even worked for another publication. Logically, it shouldn't have worked at all.

On a few special occasion, writers were allowed to meet, the most interesting of which was a couple of training days at the Newcastle Evening Chronicle. Probably disturbed by the awkward styles exhibited by some writers, me being candidate number one, we were put together for an insight in how to craft newspaper copy.

Some got more out of the event than others, but it was interesting to put faces to names that I saw on a regular basis.

“ No matter how pretty I could make something look on the screen, the print process would turn it into a spider chasing a soot-smothered moth in a darkened coal shed ”

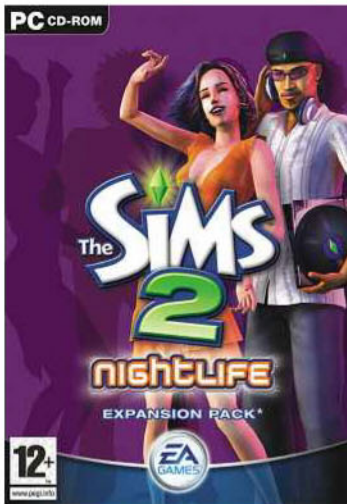
What we all shared was the difficulty of doing our part of the process in a way that didn't cause massive problems further downstream. What made it especially challenging, though, was the tools that most of us used at this time, because standards in regard to file formats and the like were still in their infancy.

Most of my early work was done on an Atari ST, before I imported my own PC from Taiwan. Word Star, Word Perfect and Microsoft Word all got used, and the number of graphics applications wielded was even more numerous.

What was most frustrating was organising graphics, especially when they'd only been supplied by the product maker on Kodak 35mm slides. Capturing graphics on the PC was generally a nightmare, and it was almost impossible to work out what they might look like once they'd been converted to monochrome.

In 1993, I got my first PC video card that could present 24-bit colour, though most games were in 256-colour modes or sometimes less. No matter how pretty I could make something look on the screen, the print process would turn it into a spider chasing a soot-smothered moth in a darkened coal shed.

All this complexity contributed to slowing down the process of getting the magazine to print, because things needed to



be prepared well in advance, undermining the advantage that being a weekly gave over the majority of monthly computer publications at the time.

Micro Mart badly needed to evolve, and thankfully it did.

The Evolution Of Micro Mart

At the very beginning, everything that was written was expressly commissioned, and software or hardware was usually supplied directly through the editorial team. A box would arrive, in it was items for review, and sticky notes would show how many words would be required on each one.

The problem with this was that if you had any issues, then you didn't have any chain of communication with the company that created the product or any great control over what items you were sent.

What also didn't help me was that when I really got upset about a product in print, the readers appeared to enjoy my rants, encouraging editorial to dispatch me more things they knew I'd hate. There have been many of these sequences during my tenure at Micro Mart, but probably the ones I recall most were the horribly obtuse *Myst* games and the pocket-money-stealing *Sims* add-ons, both of which I was subjected to repeatedly.

Eventually, through a natural development, writers got more freedom to source their own products, follow their own interests and generally make the magazine a more diverse work.

From what I recall, the early issues covered all aspects of the expanding computer horizon, covering all the new platforms and the many different ways that enthusiasts were programming them. But by the early 90s, the PC was beginning to draw the curtain on the failed evolutionary pathways, and it was

Microsoft Windows that was driving the world, and the mag, to become predominately PC.

There was still some interest in Apple, and some quirky alternatives like Psion and Palm, but the vast majority of our readers had a PC. That ultimately led into system building and customisation, as people explored how to make their systems better through modifications.

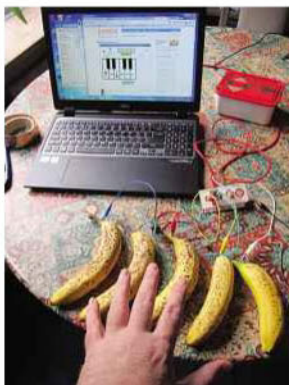
Now we've come full circle, with Arduino and Raspberry Pie, Android and iOS. The PC appears to be in a terminal decline, and alternative technologies are flooding in to occupy the open spaces. Isn't this exactly where I came in, 30 years ago?

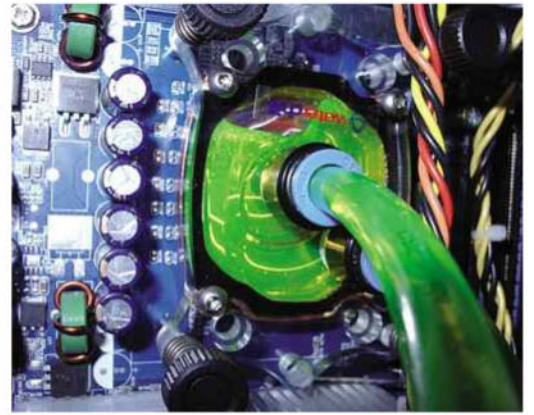
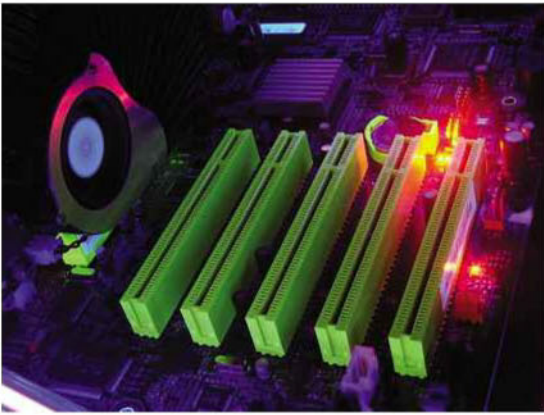
Along with changing topics, the appearance of the mag also systematically changed, as did the balance of the parts and how much editorial was included. But for me, the thing that really excited me was when we started to use colour, like I was already accustomed to in my work for monthly publications.

Colour leaked into the mag through a number of distinct stages, as I recall. First the front page got 'spot' colour, where red and occasionally another colour could be used alongside the black. Then these highlight colours made it to some of the internal pages, and then eventually a proper colour cover came and then full colour in fullness of time.

This, however, wasn't without its dangers. Colour registration provided massive headaches, and I remember because of it, a number of issues were challenging to decipher. Print and typographical problems are always lurking beneath the surface, but during this time it wasn't uncommon to see entirely blank pages or ones that magically returned from the previous issue.

There was little that could be done other than to swiftly move on to the next issue and hope the complexity of creating a weekly publication with the resources available wasn't





completely impractical. Problems were addressed, new ones emerged, the battle raged on, but we were winning, if slowly.

The difference between a 1985 Micro Mart and, say, one in 2003 was massive, not only in appearance but also the quality of the typesetting, writing and presentation. Our readers become increasingly sophisticated and expected the title to keep pace, at the very least.

Thankfully, the internet was rapidly enabling us to keep up.

Let's Get Digital

The print industry is one that hasn't handled change well, historically. But given the magazine's remit, it moved rather smartly to embrace the tsunami of innovation that came in the years that preceded the millennium.

The internet was the major motivator, because it not only empowered writers to dispatch copy on deadline day, rather than it being lost in the post, but also it provided a means to source information and images more easily. It also allowed for

“ Eventually, through a natural development, writers got more freedom ”

more direct communication with the technology companies and their representatives, for better or worse.

For the first time, breaking stories could be pounced on immediately and carried in the following issue. As the speed of connections grew and the information online became greater, writing for Micro Mart became easier, and the articles better researched and illustrated.

It was ironic, therefore, that at this time of great advancement, I'd take a two-year sabbatical from writing for a number of personal reasons. I won't go into all the details, but there was a clash of personalities involved that was ultimately resolved, and I returned.

In the meantime, I'd become very disillusioned with having a career in IT, and eventually transitioned into being a journalist full time. Fourteen years and around 8,000 pages in Micro Mart later, I'm still doing this, which is probably a combination of my stubbornness and the readers' resilience to my abysmal prose.

While I don't earn the hefty sums that being an IT professional once returned, the lifestyle of a freelance writer is one that I'd genuinely not wish to end. I get to my home

office, downstairs these days, at around 7am, review my tasks for the day, write those pieces that I've planned, manage those review products I'm expecting, and box those being collected by their owners.

Usually, unless I've some special reason to carry on, I finish before 2pm and then head to the gym for a couple of hours. As work/life balance goes, it's pretty good, although interacting with couriers who can't find the house or don't turn up when they're expected can be annoying.

These days, there are a lot less fraught deadlines and more time to consider if all change is good and to hold those who force it on us to account.

Challenging Times

There was a time when I would go to my local newsagent and it would take me at least five minutes to locate Micro Mart in the computer section. Alas, those days are long behind us, as are so many titles that were part and parcel of the computer revolution. While some of them remain in the wholly digital realm, the declining interest in computing generally took its toll and continues to do so.

As a person who was part of the computing explosion in the 80s, that things blossom and then die-back shouldn't surprise me. But when you start to go through some of those publication names, some of which I even wrote for, the effect can be distinctly sobering.

While not the whole story, some of the issue has been the altering of computing devices to be appliances, like kettles or freezers. You buy these things and plug them in to use; there isn't any great appetite to understand the technology behind their functionality. And Apple effectively through the iPhone and iPad did the same to computers, where it wasn't necessary to understand the inner workings to make them work for you.

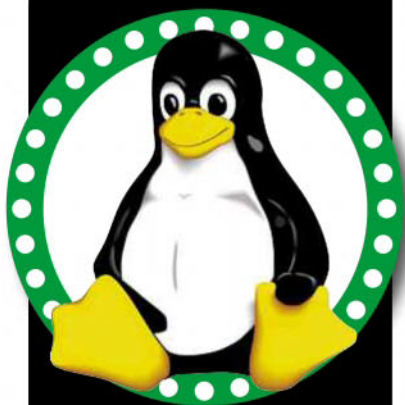
Without the need for any great explanations, the necessity for technical publications declined. Online publications can always beat publishing deadlines and can fix their typos without the need to put a retraction in the next issue.

But for all this race to the digital precipice, there still seems to be a place for Micro Mart, a narrow slice of old-style computing enthusiasm in an increasingly brand-focused future.

I like to think that the viewpoints presented in these pages aren't the ones you'll see paraded online, as we're not in the business of merely generating clicks.

The fact that Micro Mart still exists today is a testament to its continued relevance, the patronage of those who buy and subscribe to it, and the creative abilities of the many people who contribute.

And I salute you all, past, present and future. **mm**



David Hayward has been using Linux since Red Hat 2.0 in schools, businesses and at home, which either makes him very knowledgeable or a glutton for extreme punishment

Linux

Getting Steamy

SteamOS is out with its Steam Machines, but how does it fare?

The Linux-related news this week isn't the sort of content Valve would have liked for its opening and launching of the Steam Machine and accompanying SteamOS.

Reports have flooded the news inbox of a drastic drop in performance of the Linux-based SteamOS over Windows on the same hardware. Bad news for Linux gamers – for the moment at least.

In reality, of course, it's a little different to what the doom-mongers would have you believe. The actual benchmark was undertaken on an Intel G3220 3GHz PC with 8GB of memory, an Nvidia GeForce GTX660 with 2GB of memory, an MSI H81I motherboard and a pair of 500GB WD Blue hard drives with a dual boot setup of Windows 10 Pro and SteamOS 2.0.4.1.0-0 installed.

Both installed operating systems had the latest drivers and updated applied, and the benchmark games used were *Middle Earth: Shadow of Mordor* and *Metro: Last Light Redux*. The games were run three times each, with the median benchmark number used.

According to Ars Technica, which ran the test, *Shadow of Mordor* on Ultra Settings managed a meagre 14.6fps when played under SteamOS, whereas the Windows 10 version could handle 34.5 frames per second.

Metro: Last Light Redux, at its maximum settings, came back with a Windows 10 frame-rate of 9.5 on the test system, while SteamOS crawled along at 4.2fps. Incidentally, the Geekbench3 Single Core tests were also higher in Windows 10 than in SteamOS.

Number Maketh OS

So what does this all mean to the gamer? Well, possibly for the time being, if you're playing either of these games on a system that's roughly the same spec as the test one used, then you're better off with Windows 10.

However, the benchmark piece has been grabbed by every media outlet going, and an almost perverse glee at Linux failing at something has been applied by some of the writers.

development, so games like the above have been developed with a strong DirectX focus.

If optimisation for DirectX and Windows drivers has been applied – which they may possibly have been – then there's always going to be a slight lean toward a Windows benchmark over a Linux one. On the other hand, games that have a solid OpenGL development, from the ground up, may well lead the way when they're run on SteamOs.

“DirectX is actually a very good API and a driving force”

We all know that GPU driver development has been behind in Linux, even with the advent of SteamOS and the Steam Machines. The developers are working to make the experience better, but the company still needs to make money, so development time is sadly put to one side.

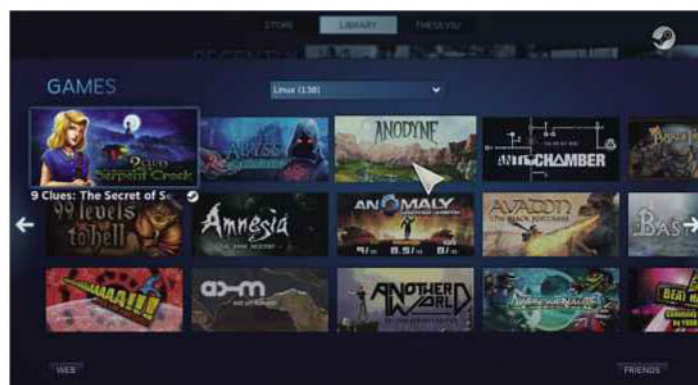
There's also the fact that, despite what many people say, DirectX is actually a very good API and a driving force for games

It remains to be seen, though.

Will this be a thorn in Valve's side, then, with the release of the Steam Machines? It'll be a shame if it is, since it's just one example. Perhaps more time was needed to get the drivers right?

Anyway, what are your thoughts on this?

▼ *SteamOS 2.0: only time will tell if it's successful or not*



A Pint Of Ol' Flexible, Please

Bartender for OS X brings back a little customisation that Apple had obliterated

The longer you use a Mac for, the more apparent it becomes that you're playing in Apple's sandpit. And for the most part, that's fine. To argue that Apple always gets things right is delusional, but to suggest it mostly does is, objectively, a fairly robust statement.

Every now and again, though, Apple makes a change to something in OS X that impacts on usability in small but important ways. In El Capitan, one change that went through finally set ablaze a loophole that had long existed regarding the repositioning of menu extras. And this made me quite cross.

Even in the computer world – and the Mac computer world, at that – what Apple did is nonetheless the definition of a first-world problem. Menu extras, for the uninitiated, are little icons that sit at the right-hand side of the OS X menu bar, providing quick access to settings. Apple's own system ones include the likes of Airport, Notification Center and Volume. Third-party menu extras I'm fond of are system monitor iStat Menus, third-party calendar Fantastical, and Dropbox.

Apple's own menu extras still get all the cool toys, but third-party ones are now barred from being rearranged. The iStat Menus developer at one point had found a sneaky workaround but, as mentioned, that's now been eradicated. The upshot of all this is being able to merrily position Apple's own extras however you want them, but not anything else. Third-party menu extras simply appear roughly in the order they were

launched. This isn't fantastic for muscle memory, and it's especially annoying for things like clocks and calendars, which traditionally sit at the far right of the menu bar.

Fortunately, as ever, savvy developers are on hand to make things right again. In this particular case, the ten-quid Bartender (macbartender.com) from Surtees Studios is an add-on I've very rapidly become a fan of. In short, the app once again enables you to organise your menu bar, providing options that Apple bafflingly declines to include itself.

I'd reviewed Bartender in the past, but its usefulness to me diminished as the number of extras I welded to my Mac dropped. Now, though, it's practically glued to my computers. And it's really smartly designed – easy to set up, and with plenty of thought clearly having gone into its various options. Active and system icons are listed in a sidebar, and on selecting one, you choose whether it should live in the OS X menu bar, be moved to the Bartender bar or be made invisible. The Bartender bar sits

under the OS X menu bar and can be activated by clicking an icon or using a system-wide shortcut. There's an alternative option for displaying all 'Bartendered' apps in the menu bar and a handy setting for temporarily showing items when changes occur, before promptly banishing them again.

Mostly, though, I really like Bartender because I can Command-drag any item on the menu bar (apart from Spotlight, which is apparently a special case) and put it wherever I want it. Presumably, this for someone in the bowels of Cupertino is the epitome of terrible Mac use, for which I should be forever forced to use a particularly nasty and unstable years-old and unsupported flavour of Linux. But I don't care. It's ridiculous that I can't adjust my menu bar in the way I can order my Dock and folders, and until Tim Cook arrives with a stern look and a crowbar, this is one digital bartender I'm happy to say offers the perfect tippie.

▼ **Bartender: now you can organise third-party menu extras in El Capitan again! Woo!**



Craig Grannell is a writer, designer, occasional musician and permanent loudmouth. He's owned Macs since 1996, when Apple was facing certain doom, and is therefore pleasantly surprised by its current success. Find Craig on Twitter at @craiggrannell

Mac



Ian is a professional IT analyst, a semi-professional writer and a pretty amateur electronic musician. He likes gadgetry and loves making gadgets do things they were never designed to do

Mobile

Big, Budget

Ian McGurran looks at a possible contender to the Moto G's budget crown

So we are now at the point of the year where pretty much every handset is out, and while there have been some interesting devices, it's been a pretty average year without much to get excited about and even fewer surprises. But there was one device, quietly released in the middle of the year only to be mostly unseen by the public at large, which has come back around to become one of the stars of the year: Vodafone's Smart Ultra 6.

Yes it doesn't have the most exciting heritage, with Vodafone's own devices generally being best described as utilitarian, including much of the current Smart range, but buried somewhere in this range of mediocre handsets is the kind of unit that you have to double-check the specs on at first glance, before triple-checking the price.

Let's run them down. Head of the pack is the 5.5" full 1080p screen, and it's a really impressive one at that, bound tightly to the digitiser and with great colours and viewing angles. Then there's the CPU: the eight-cores strong, 64-bit Snapdragon CPU is no slouch, and coupled with a very decent 2GB RAM, Android Lollipop has plenty of room to stretch. There's also 4G, 16GB RAM, micro-SD and a very healthy 3000mAh battery that runs that vast screen well over 24 hours.

So realistically you're looking at somewhere between 2013 and 2014 flagship spec here, at far from flagship prices. The ZTE-manufactured Smart Ultra 6 was originally released at a staggering £125, but can

regularly be found now for £99, pretty much destroying most Android handsets up to £199, certainly all the phablets.

Specs are one thing, but what's it like in use? If 10 is flagship smooth and 0 is one of those terrible cheap phones that chugs, the Smart Ultra 6 is coming up on an 8. That's not to say it isn't nice to use; it just has moments of stuttering that an octocore 2GB handset shouldn't really have. Beyond that, it's very good. The OS is barely touched by Vodafone, so really its base Lollipop (especially if you grab the Android Home launcher), and the material design looks gorgeous on the screen, the white balance proving as good as the iPhone 6 Plus that it shares the same spec screen with.

Design-wise it's not bad. It won't win awards, but it is attractive in a functional way, like a big Galaxy S2, and it's very light indeed. This is doubly impressive as the battery is still long lasting, with 36 hours being pretty easy to get to on average use. But make no mistake: the Smart Ultra 6 is very big in the hand; some will like this but some just don't like bigger phones.

So why is the Smart Ultra 6 a possible benchmark? Well, at the time, the Moto G offered most of what the flagship devices were offering at the time for much less and with few compromises. Now, the Smart Ultra 6 offers most of the 'flagship' experience – size, high density screen, power, higher-than-average RAM – for at least a third of the cost. Not only that, but these devices make it difficult for other budget devices offering less to

justify themselves. Surprisingly, Samsung and HTC has actually done little to counter the Moto G, with its budget range handsets still offering pretty poor value. It seems they still continue to sell by name alone, though this appears to be increasingly less.

The Smart Ultra 6 might not be the next Moto G (it needs to be unlocked and is exclusive to Vodafone, so less will encounter it), but it sends out a signal that the power gap is closing, and the big names may not be able to sell their next line of expensive handsets on design alone. If a device of this nature comes out, at this price and with impressive design, the jig could well be up for the big names.



Tasty SSDs Speed Into Shops, Just In Time For Christmas

Find out why Crucial and Samsung's latest SSDs have had Andrew Unsworth scribbling wishlists to Father Christmas

Crucial recently released the BX200 SSD as a replacement to the very much admired BX100 SSD. This may not seem like much of an announcement, but when it comes to SSDs, Crucial has always, in my opinion, provided the best balance of performance and value. I like the Samsung 850 Evo too (this is the last SSD I bought and I've been more than happy with it), but if cost is the most important factor, then a Crucial SSD should be at the top of your list. I've used one of them for years and it's still in fine working order.

The Crucial BX200 is very much designed for consumers and is priced to sell. It's available in three different capacities, with prices ranging from £63 for the 240GB model, £110 for the 480GB model and £222 for the 960GB model (prices from www.scan.co.uk). 240GB is a very usable capacity, especially for a laptop, so anyone looking for an inexpensive SSD to upgrade an old computer should definitely consider one of these devices.

Crucial claims the same performance for all models, with a sequential read speed of 540MB/s, a sequential write speed of 490MB/s, a random read speed of 66,000 input/

output operations per second (IOPS) and a random write speed of 78,000 IOPS. I haven't tested the speeds in a real-world environment but, going off past experience, I'm sure it's no slouch.

One major concern of those migrating to an SSD from a mechanical hard drive is having to install a new operating system and then reinstall applications and files. This can be a real hassle, which is why it's good to see Acronis True Image HD ship with the BX200. Acronis True Image HD lets buyers clone their existing hard drive to the BX200 so the BX200 is ready for use once installed. Check out the BX200 at www.crucial.com/uk.

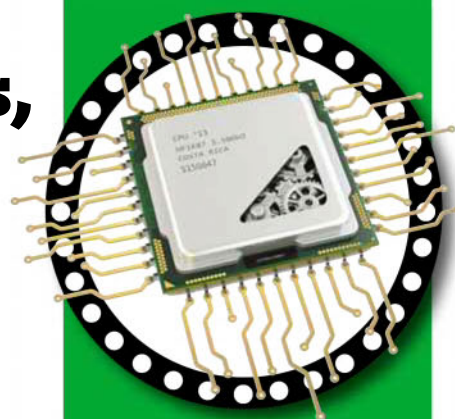
Of interest if you have more money to spend, and a slot to accommodate it, is the blisteringly fast Samsung 950 Pro (tinyurl.com/onqgahl), which was recently reviewed by our chums at Expert Reviews (tinyurl.com/p4uyysx). The 950 Pro is intended to sit in the M.2 slots that frequent Intel Z97-, X99- and Z170-based motherboards, and some ultra-thin laptops. M.2 SSDs are wonderfully small, but the 950 Pro's biggest advantage is speed.

The 950 Pro is capable of a 2500MB/s sequential

read speed and a 1500MB/s sequential write speed according to Samsung. This is because the 950 Pro uses the non-volatile memory express (NVMe) interface, which uses a motherboard's PCI Express lanes to deliver data. PCI Express allows for faster data transfer than SATA-3, which has become something of a throughput bottleneck for solid-state drives. Expert Reviews clocked the 950 Pro's transfer speeds at up to a super-fast 1349MB/s when writing large files and up to 2064MB/s when reading large files, for example.

These speeds make the 950 Pro phenomenally fast, although you'll have to pay more for the privilege compared to a standard SATA-3 SSD, with the range priced from £115 for the 256GB capacity model to £320 for the 512GB model (www.scan.co.uk).

The 950 Pro is a 2280 form-factor device, and as it uses PCI Express and the NVMe interface you'll need to check that it's compatible with your motherboard before purchase. This is especially true if you wish to boot from it. If the 950 Pro is compatible with your motherboard, it could be just the ticket for building a super-snappy system.



Andrew Unsworth has been writing about technology for several years, he's handy with a spanner, and his handshaking skills are second to none

Hardware





Ryan Lambie has loved videogames since he first stared up in awe at a *Galaxian* arcade cabinet in his local chip shop. 28 years on, Ryan writes about gaming for Micro Mart. He's still addicted to chips and still useless at *Galaxian*



Veteran game designer Jon Hare returns to the field with *Social Soccer*, the 21st century update to one of the most beloved football games of all time

This week, Ryan checks out the spiritual successor to Sensible Soccer, and takes a closer look at the controversy surrounding Payday 2...

Plug & Play

If you've never heard Jon Hare's name before, you may have played his games. As the co-founder behind the British studio Sensible Software, he co-designed the magnificent shooting game *Wizball* in the 1980s and the action strategy classic *Cannon Fodder* in the 1990s. One of the studio's most enduring titles, meanwhile, was *Sensible Soccer*. First released in 1992, the series was distinguished by its fast action, top-down view and tiny sprites, and it was hugely entertaining to play against a friend – even if you didn't have a particularly keen interest in football.

It's been eight years since we last saw anything from the *Sensi* series, but Jon Hare has recently taken to Kickstarter with *Sociable Soccer*, a self-described 'spiritual sequel' that is clearly in the same lineage of its 90s predecessors. The top-down view's back (though you'll be able to switch perspectives, too, we're told), as is the lightning-fast passing and adorably diminutive footballers – but because this is 2015, they're built out of polygons instead of a handful of pixels. Footage from an early build of the game, which uses Unity, looks remarkably slick for what it is, with smooth

player animation, a snappy passing mechanic, and a pleasing speed blur effect applied to the ball – we're not sure whether it's intentional or not, but it seems to approximate the same speed blur you used to get when playing *Sensi* on a CRT monitor back in the 1990s.

While single and local two-player will be making a comeback, one of the most promising draws in *Sociable Soccer* will be its online mode. "One of the things we weren't able to offer back in the days of *Sensible Soccer* was online multiplayer," Hare says in his new game's Kickstarter pitch video. "But with *Sociable Soccer* I'm delighted to say it's finally here. One of our online leagues is devoted to fans of a particular club playing together as a club against the fans of another club."

As well as online tournaments and clans, up to eight players will be able to play local matches on one machine, which should make for a fun, yet rather crowded, evening in. Hare clearly has big things in mind for the game's online leagues and tournaments, and he says the controls will be configurable for those who want to make the game play a bit more like, say, FIFA or PES. But while it's billed as a more complex, flexible

football experience, it'll also have the same direct, arcade-like simplicity that made *Sensi* such a blast, Hare says.

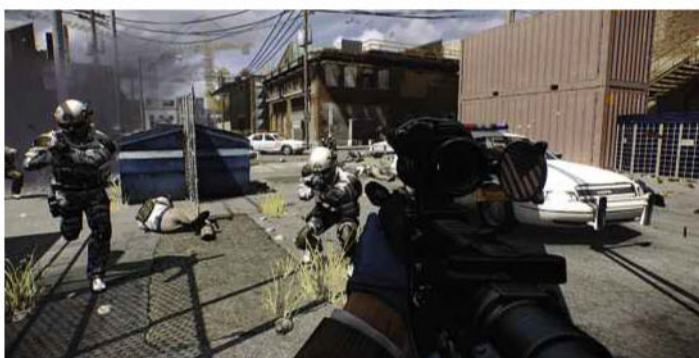
"It will be a game that on the one hand is appealing to real football fans," Hare told *Eurogamer*. "I'm a massive football fan, so I'll make sure that's done properly. On the other hand, it'll appeal to people who just want a game that's fun."

You can find out more information about *Social Soccer* at kck.st/1NMFcwX.

Online

Grand Theft Auto may be a strong competitor, but *Overkill Software's Payday 2* has a dedicated core following when it comes to multiplayer crime simulators. With players able to stage heists in gangs of up to 12, among other various virtual misdemeanours, the shooter sequel has retained a healthy following since its launch in the summer of 2013.

Recently, however, some of *Overkill's* changes to the game have caused a considerable amount of friction among said following. In October, the studio introduced a series of paid-for weapons skins which can have a tangible effect on player stats. These skins are stashed away



▲ Despite firm assurances that microtransactions wouldn't be a part of the full-priced *Payday 2* when it launched in 2013, they've recently been added – and caused a backlash from fans

randomly in safes, which must be drilled open at a cost to the player of £1.60. Once acquired and equipped, these skins provide a boost to player performance, or alternatively, they can be sold on to other players for a profit.

It's quite a climb-down from two years ago, when *Payday 2* producer Almed Listo pledged that, "We've made it clear that *Payday 2* will have no microtransactions whatsoever." When asked about microtransactions by *Gamespot*, his reply was unequivocal: "No. God, I hope not. Never. No."

Clearly, there's been a change of approach behind the scenes, and it hasn't gone down well at all with *Payday 2*'s players.

Many took to Reddit to complain vociferously about the move, while several others swamped the game's Steam page with negative reviews in order to bring down its average score; within days, its original rating of 94% had tumbled to just 79%.

Overkill went a step further in mid-November, as it introduced Team Boost, a further set of skins that provided boosts to players' cash and experience points. Worse still, at least for those unwilling to stump up the cash to at least have a chance of getting hold of them, Team Boost – as its name implies – gives an entire squad of players an added advantage. "It's like they're trolling their fans at this point,"

was how one *Payday 2* player described these latest editions.

Amid a fresh storm of protest, the game's Steam moderation team has quit, citing the torrent of negative feedback on the platform – including alleged death threats – as one of the primary reasons for their departure.

"We are not paid and have been in a very stressful situation," one moderator wrote. "If Overkill decides to let us go as moderators it's something we are prepared for, I personally cannot sit by when they continue to promote immoral business practices. I felt the skins system needed work but could function. The recent safe update showed against that."

Overkill has argued that the Black Market update, which introduced these transactions, is vital to fund a now two-year old game, and adds that, "Right now, things are looking pretty great."

We'll have to wait and see how these changes affect *Payday 2*'s long term future; for now, it's clear that the new Black Market hasn't exactly endeared itself to the game's core players.

Incoming

Indie studio Gun Media's attempt to create an asymmetrical multiplayer game from the *Friday The 13th* franchise has proved to be a resounding success, with the Kickstarter campaign managing to garner just over \$820,000 – far exceeding its \$700,000 minimum goal. The game will pit seven hapless summer camp counsellors against one hulking, bloodthirsty Jason Voorhees, and it sounds like a fun twist on the gameplay popularised by *Left 4 Dead*. If Gun Media get the game's balance right, then *Friday The 13th* could make a killing when it emerges in 2016.



▲ Having successfully reaped the money it was looking for on Kickstarter, the multiplayer videogame *Friday The 13th* is a go. Expect it to leap out of the shadows in 2016

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2/3 CCL	27 Transcend
6/7 Morgan	30/31 Mesh
11 Chillblast	41 iStorage
17 TP-Link	43 Falcon
18/19 Aria	115 Eclipse
	116 Rapoo

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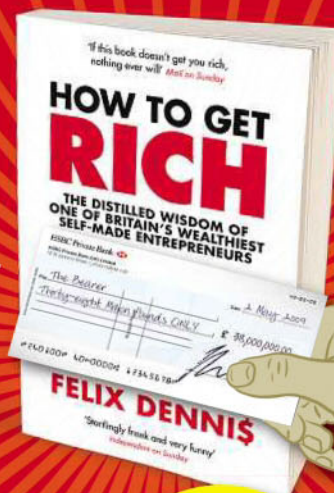
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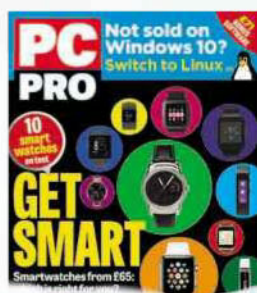
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Laptop for sale. Toshiba Portage i5 2.5ghz Model R830-13c 4gb memory, 320gb hard drive. Wi-Fi, fingerprint scanner, HDMI output. Sold on eBay for over £200; only £150 plus £15 p&p. Absolute bargain. Great condition. Very light.
Tel: Dave Thomas (07828) 982930 or (01942) 706571 Email: dave.thomas96@aol.com

ASUS P5QL-EPU Motherboard - 775 Socket - DDR2. Tested, from a working environment, comes with I/O Plate. £45 inc Free Courier. Payment via PayPal.
Email: info@jmcomputing.info

ASUS P5B Motherboard - 775 Socket - DDR2. From working environment, w/ I/O Plate. £35 inc Free Courier. Payment via PayPal.
Email: info@jmcomputing.info

HARDWARE WANTED

Trying to breathe life back into an old machine? Why not submit a wanted ad to MicroMartClassifiedAdverts@gmail.com and see if any of the thousands of computer enthusiasts who read the magazine each week have what you're looking for?

Wanted: Instructions! A couple of long shots, but does anyone have instructions for the TEXET T581 BN programmable scientific calculator or the ZOOSTORM Fizzbook NL2 model [not the one available on the net - wrong model]?
Email: Alan Cox alancox28231@gmail.com

WANTED: You bought a Corsair water cooler, with a square block. You fitted it to your Intel processor. You want to make a few pounds from the spare A.M.D. bits? Contact me!
Email: johnrpeel@gmail.com

WANTED: Gigabyte GA-Z77X-D3H motherboard wanted.
Email: johnbeiry@gmail.com

WANTED: PC Tower case (beige colour if possible) to rehome an Amiga A1200 vintage computer. The Amiga motherboard is H 410mm x L 190mm (H 16" x L 7.5"). PSU not an issue but if available 250 watt more than enough.
Tel: Bill (07742) 061569 or (02641) 769503.

WANTED: 3G dongle for Archos 80 G9 tablet.
Email: alancox28231@gmail.com

WANTED: Fractal Design Define XL full tower case. R1 (original version) in black.
Tel: (01670) 860146
Email: mm@tectron.co.uk

SOFTWARE FOR SALE

Sim City 2000: Boxed and original. Classic gaming. £15.00
Tel: Gordon (01314) 660205 Email: scobie09@gmail.com

Adobe Photoshop Elements and Premiere Elements 12 Full Version - Windows/Mac. Original Boxed CD with unused product key. £47.50
Tel: Ian (01932) 856971
Email: a2345@btinternet.com

PCB design software. 127 layers, schematic entry, PCB entry, PCB to Gerber file converter, output to printer. £9.99
Tel: Nigel Wright (07967) 527693
Email: cresswellavenue@talktalk.net

Microsoft Office 2013. Original Software only £100.
Tel: Gordon (01314) 660205
E-mail: scobie09@gmail.com

Cyberlink PowerDVD 12 Standard. Runs under Windows 8, 7, Vista or XP. Original CD with unused product key £7.50
Tel: Ian (01932) 856971
Email: a2345@btinternet.com

Nuance Omnipage 18. OCR Runs under Windows 8, 7, Vista or XP. Original CD with unused product key £25.
Tel: Ian (01932) 856971
Email: a2345@btinternet.com

Acronis True Image Home 2012. Bootable CD. Application runs under Windows 8, 7, Vista or XP. Original Acronis CD with unused product key £5.
Tel: Ian (01932) 856971
Email: a2345@btinternet.com

Norton Family Premier 2.0. Runs under Windows 8, 7, Vista or XP. Original Symantec unused product key £15.
Tel: Ian (01932) 856971 Email: a2345@btinternet.com

SOFTWARE WANTED

Wanted: PictureToExe software, for making picture shows.
Tel: (01202) 610602 Email: ivor.mary@talktalk.net

Wanted: Quicken 2001. I desperately require a copy of QUICKEN 2001, UK Edition. I need to reinstall the program but have lost my original installation CD.
Email: david.maddams@icloud.com

IMPORTANT BUYING ADVICE

We work very hard to police our classified ads, and make them as secure as possible. However, please do your bit too and use the following guidelines:

- **Never - NEVER** - pay by bank transfer or post out cash, unless you know the trader already, or are sure it is okay to do so. Pay by cheque, Paypal, Nochex etc wherever possible.
- Be wary of anyone who insists on you paying by the above methods if in doubt, get us to check them out by mailing editorial@micromart.co.uk
- Keep copies of all correspondence
- When sending out goods, at the least obtain a certificate of posting from the Post Office

If you are in any doubt, feel free to send us a mail via editorial@micromart.co.uk.

Every year, thousands of successful transactions take place through our classifieds, and that's just how we like it.

Help us help you keep them one of the safest and most secure places to buy and sell computer kit.

Code With AI2

Stock Quote

Build an Android stock quote app with David Briddock

Over the last few issues we've used AI2 and Google's cloud-hosted mapping service to plot GPS geo-location coordinates onto a map. This time we're going to access a cloud-based financial data service. Remember, all you'll need to play along is a Windows/Mac/Linux PC, web browser and Google account. Ideally you'll also have an Android smartphone or tablet, but even this isn't essential.

What We'll Learn

This week we'll introduce the Web component which allows us to take a web request text string and send it over the internet. With the same component we can receive the response from the target web service. This response can then be processed and displayed on the screen.

Let's get started.

Starting AI2

In your browser navigate to the AI2 home page (ai2.appinventor.mit.edu) and sign in with your Google account.

We need a new project so in the Projects menu select the 'Start new project' option and give it a meaningful name, such as 'MMStockQuote'.

Screen Properties

We're automatically taken to the Designer View where there's already a component called Screen1. All the other components we will use for this software be dragged and dropped onto this screen.

In the right-hand Properties panel ensure the AppName field is set to 'MMStockQuote', then set the

Title to 'MM Stock Quote' and the ScreenOrientation to 'Portrait'.

Now we'll add some screen components too.

Symbol Fields

First we need a stock symbol entry field and associated label located next to each other using a layout. To find what we need, in the left-hand component Palette open the Layout group. There you'll find HorizontalArrangement; grab that and drop it into the Screen1 area in the Viewer panel. With the layout selected in the Properties panel set the Width to the 'Fill Parent...' option.

Refresh Button

Next we'll add a web request button. Back in the Layout group, grab a Button and drop it directly underneath the HorizontalArrangement1 component.

Rename it to 'RefreshButton', then set the FontSize to 24.0, the Width to 'Fill Parent...' and the Text to 'Refresh Quote'.

Output Display

We want to display the returned stock quote information in a simple label. To set this up, grab one and drop it directly underneath the RefreshButton. You should rename it as 'Output' for clarity then, in the Properties panel, set the FontSize to

“ This time we're going to access a cloud-based financial data service ”

Now back in the Layout group, grab a Label and drop it into the left-hand side of the HorizontalArrangement1 component. A blue bar appears to indicate its drop position. With the label selected set the FontSize to 24.0 and the Text to 'Stock Symbol:'.

Back in the Layout group, grab a TextBox and drop it into the right-hand side of HorizontalArrangement1. With the text box selected rename it to 'Symbol', then set the FontSize to 24.0, the Hint to 'Stock Symbol' and the Text to 'GOOG'.

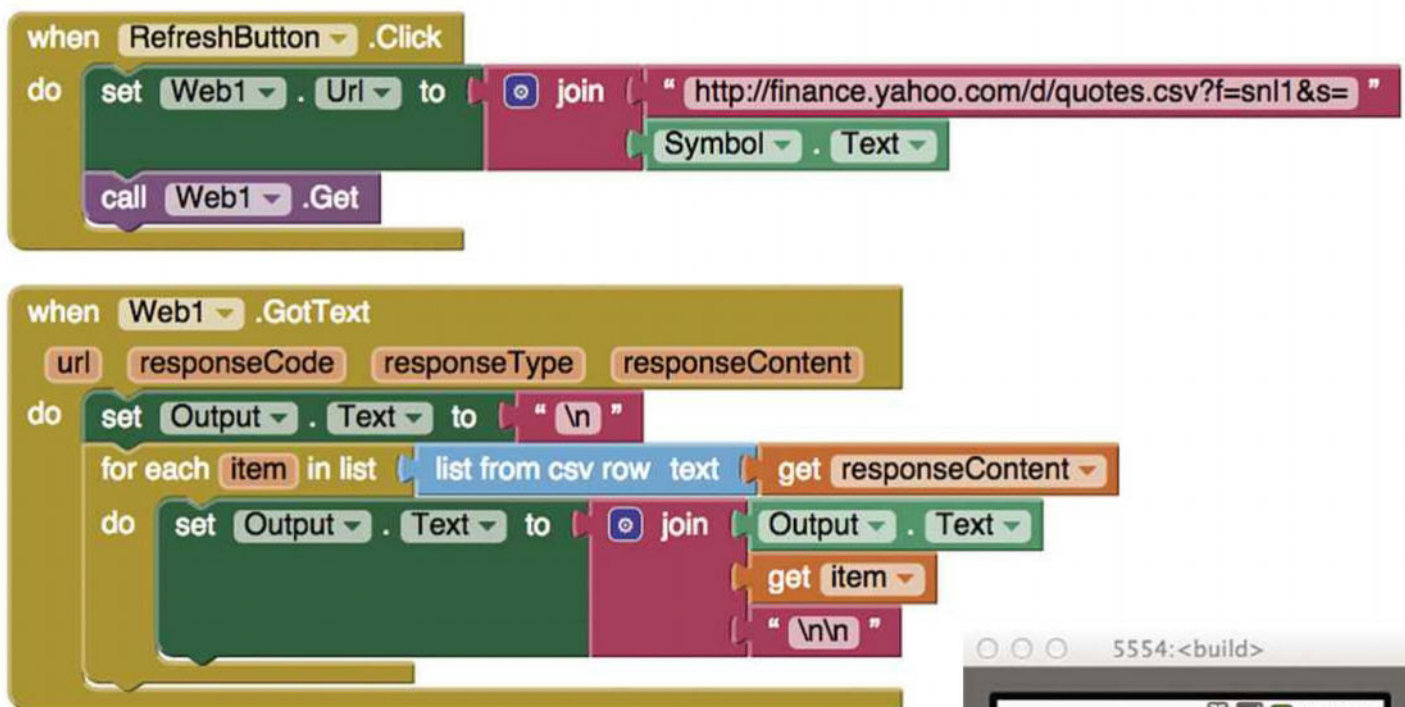
The text value we've used is Google's stock symbol. For a full list of symbols go to eoddata.com/symbols.aspx.

24.0, click on the FontBold checkbox, set both the Width and Height to 'Fill Parent...', the TextAlignment to 'center' and the Text to an empty string.

Web

Finally, we'll add a Web component. So first let's head into the Palette panel, open the Connectivity group, grab a Web component and promptly drop it onto the Screen1 area.

You may notice that, when you do this, Web1 appears in a Non-visible Components area underneath the screen as well as in the Components panel. We'll come back to this shortly.



▲ AI2 blocks view

App Code

It's time to start coding, so let's get to it by clicking on the Blocks View button located on the green bar.

We'll use the symbol field value to build a request for the Yahoo finance service, which is accessed via the Web1 component. The resulting stock quote is displayed in the Output label.

Button Click Event

First select the RefreshButton, grab a brown 'when RefreshButton.Click' block and drop it into the coding area.

Inside that, add a green 'set Web1.Url to' block, then snap a magenta 'join' Text group block onto the end of it. Now we're going to create a URL request that returns the stock's symbol, name and current value.

The first 'join' item is set using a simple text string block with a 'http://finance.yahoo.com/d/quotes.csv?f=snl1&s=' value (note the 'f=sn' is followed by a lowercase letter 'l' and the digit one). The second item is the symbol field text, namely a light green Symbol.Text block.

Request Completed Event

Now grab a brown 'when Web1.GotText' block and drop it into the coding area. Inside drop a green 'set Output.Text to' block with a Text value of '\n' string (which represents a newline character).

The Web1 block has a 'responseContent' attribute. The contents take the form of a comma-

separated value (CSV) string, for example "GOOG","Google Inc.",521.52.

For our purposes, we need to convert this CSV string to a list. From the Lists group, grab a blue 'list from csv row' block and drop it into the coding area. Now snap a 'get responseContent' attribute block onto the end.

We'll loop through each item of this list in sequence. Grab a brown 'for each item in list' block from the Control group and drop it under the green block. Now snap the blue 'list from csv row' block we added earlier onto the 'for each' line (see Blocks View image).

Inside the loop, text strings are appended to the Output label using a magenta 'join' Text block. Grab one, snap it into place, then use the tiny blue button you'll see to the top-left of the block to add a third 'join' string. Set these items with an Output.Text block, a list item 'get item' block and a simple Text block containing two newlines respectively.

Testing

And that's the coding done for this week. Ensure the warning and error counts in the bottom left corner are both zero and carefully check your code against the Blocks View image.

Test the app using the Emulator or the AI Companion App installed on an Android device (which we discussed in details earlier in the series). As we're calling a web service you'll also need to be connected to the internet.



▲ AI2 app

Going Further

One way to enhance this app is to check for web service error codes (hint: a value 200 means all is okay, the rest is up to you).

Next time we'll build a scanning app that interprets those square QR Codes you often see in newspapers, magazines and on web sites. [mm](#)

ASK AARON



Meet Aaron Birch. He's here to help you with any general upgrading, software and system building problems. He's got advice aplenty and you're very much welcome to it!

Send your questions to:
Aaron Birch
Micro Mart
Dennis Publishing
30 Cleveland Street
London
W1T 4JD

Contact Aaron by email at:
aaron@micromart.co.uk

Please try to keep your queries brief and limit them to just one question per letter, simply so we can squeeze in as many as we can each week. Please include relevant technical information too.

Aaron

Unbootable

I was inspired by your great article 'Know Your SSD' in October, and decided on two Samsung 850 EVO 250GB drives, one to replace a faulty HDD on my son's PC and one for my own PC. For the first, a clean install of Windows 7 went well, and the PC has been transformed. Mine has not been so easy.

I was advised by the man in the superstore (you know the one – but the price was right!) that the drives come with a SATA-to-USB cable. They don't, although the instructions expect you to have one. I bought a Startech equivalent online. Samsung Magician did not recognise the SSD as being one of its own, so I abandoned this idea. I used MiniTool Partition Wizard Free and created a partition of 200GB for the OS and programs on the HDD.

I then used Macrium Reflect to clone the partition onto the SSD via the cable. Both programs were very simple to use. The SSD was then substituted for the HDD, but would not boot. It hangs at a black screen telling me that the Intel controller only supports HDDs and CD ROMs. If I shift the SSD to another port and boot from HDD I get a similar situation. The motherboard is a Gigabyte H55M-UD2H with F11 BIOS. Where do I go from here?

Thanks for your help.

Steve

There are two major suggestions I can make here, Steve, that should help you get up and running with your new SSD.

First, I suspect your motherboard is currently set to IDE for hard disk storage, and to use your new SSD you'll need to switch this to AHCI. You do this in the BIOS, where you'll find an option to change this. It's possible to use

IDE for SSDs on occasion, but for the most part, you need to set your motherboard to AHCI. This should work and is also the optimum setting for SSD.

You may also need to reinstall the OS on the drive from scratch, and set it to AHCI, as changing this setting with an existing OS installation can cause problems. Before you do this, simply try changing the option in the BIOS,

**“ You may also
need to reinstall the
OS on the drive ”**

as this may work on its own, without the need to reinstall the OS.

Also, for other readers with problems like this, I'd strongly suggest an update to the motherboard's BIOS and to download the latest version from Gigabyte's website. F11 seems to be the latest, however, so it would appear as though you already have the latest available.

Although it's always tempting to clone or copy an OS from an old hard disk to a new one, I've found this to be fraught with problems, so I usually bite the bullet and start from scratch. You may need to format the drive, install it, and then boot up into Windows' setup so you can start fresh. At least this way, you'll eliminate any problems caused by the clone, so you know exactly where you stand.

▼ SSD drives make use of AHCI, and in some setups, they'll run with nothing else



Pre-built Blues

Yes, I'm another one of those people who have little to no experience with PCs. As such, I recently bought a new PC, which I had built for me by a local shop. I chose the parts and whatnot, but they built it for me and set it up, as I don't know how.

When I got it home, I fired it up and was asked to enter my username and password. The problem here? I don't have one. I've never used the PC or set up any such password. I've tried different things, but nothing works. I can apparently use an email, so I tried my own email address and password, but this also didn't work.

I have no idea what to do here, and I've got a PC that I just can't use, as I can get into it. Is there something I'm missing here? Help!

Bill

I think the simple answer here is that your PC, while new, hasn't been built and sysprepped as most new PCs should be. Instead, whoever built the system set it up, installed Windows, and then logged onto it to finish setting it up with drivers and software. This means your system is probably 100% configured, and ready for use, but it also has an existing user, hence Windows' prompt for you to log in.

Sysprepping is a method used by most system builders and gets a system up and running to the point where Windows is ready to perform its final setup routines. The system will ask for a new user, and you're able to create a new account and login. This has already been done on your PC, so this isn't an option.

The easiest way to get around this would be to call the store and ask for the login information used. When you use this, you'll be able to log into the PC, create your proper account, and then log in as that. It's likely the system builder enabled

and used the administrator account, which you should leave for when it's needed, for troubleshooting and so on.

If, for some reason, you can't do this, you'll really need to boot up with your Windows install and reinstall the OS, thus starting the setup process from the beginning. This will let you create your new account, and you'll be able to log in as normal.

As you've never logged into the system, you shouldn't lose any data, unless some OEM programs have been installed and you don't have the installation media for them. Again, the only way to really address this is to contact the shop.

▼ **Sysprepping makes the initial setup process easy for the end user**



Mirror, Mirror

I have an Acer laptop (E5-571) which I've hooked up to my TV for a long time using HDMI. This has always worked with no problems, until I upgraded to Windows 10. Since then, I've been unable to mirror the display to the TV.

I've tried using the various shortcuts, such as the laptop's own Fn shortcut and Windows keys, but nothing seems to work. I've even tried different HDMI cables, just in case there was a fault, but nothing has helped. Do you have any ideas?

Kat

Your problem here may lie with the Windows 10 upgrade, in that the laptop's chipset firmware may be outdated. Acer released new updates post-Windows 10, including version 1.27, which improved overall system performance, as well as tweaks to the Intel Legacy VBIOS. I'd suggest you visit the Acer website and download this. Once it's done, try connecting to your TV again.

Alternatively, the problem may be caused by problems with drivers, especially generic PnP drivers. To check this, ensure the HDMI cable is unplugged and open up an admin command prompt and type 'set devmgr_show_nonpresent_devices=1' then press Return and type 'devmgmt.msc' and press Return again.

Now, open Device Manager and make sure it's showing hidden devices. Check under the Monitors section. If you see any faded entries, uninstall them (right-click and select uninstall). Now, reboot the PC, and when it's ready, connect the HDMI cable and try the TV. With luck, it should now work.

▼ **HDMI is a standard connection, but some system setups may have problems post Windows 10, and updated drivers may be the answer**



ASK JASON



Meet Jason D'Allison, a veteran of Micro Mart's panel of experts. He's here to help with any technical questions, including anything to do with tablets or smartphones, as well as PCs

Send your questions to:
Jason D'Allison
Micro Mart
Dennis Publishing
30 Cleveland Street
London
W1T 4JD

Contact Jason by email at:
jason@micromart.co.uk

While we try to cover as many questions as we can, we regret that Jason cannot answer your questions personally, but he'll cover as many as he possibly can each week. Please ask one question per letter and remember to include the full specification of your computer, including its operating system.

Jason

'X' Marks The Spot

I've just become **very** annoyed by a persistent pop-up urging me to upgrade to Windows 10 (I'm running Windows 7). I simply couldn't get rid of it – there was no 'X' to click – but it disappeared eventually. I've attached an image. This sort of carry-on does nothing to persuade me to upgrade. It seems Microsoft wants to take control of my PC!

Peter Heaven, TalkTalk

It's a bizarre pop-up, Pete, I agree. When I first saw pictures online I felt sure it must be bogus. But it's legit. So, Windows 10 includes numerous security features, but it doesn't include reinforced concrete. Thanks for telling us! I'm guessing it's a joke dreamed up by a development team high on crack caffeine. 'Kitchen sink' would have made more sense. A 'support engineer' on Microsoft's website, on seeing a user's screenshot, suggested 'reinforced concrete' might be a program on the user's PC (goo.gl/a08XmM). I guess he didn't receive the memo!

On every other example I've seen, there's been a close button – an 'X'. But it's definitely missing from yours. Could you be the victim of malware? Is your pop-up trying to pass itself off as the real thing? I doubt it, but stranger things have happened.

I do have some sympathy for Microsoft. Many users simply aren't aware that they're entitled to a free upgrade to the latest OS, and for them these informative pop-ups are likely to be welcomed. For techies who are in the know but not interested, however, the nagging can be intrusive. Microsoft can't win this one, Pete, but in my view it's struck a pretty good balance.

▼ *If you see this and there's no 'X' in the corner, should you be worried that the sky's falling?*



Green Vs. Blue

I recently bought a 2GB GeForce GTX 750 Ti graphics card for my PC. I'm happy with it, but I now realise my CPU is holding things back. It's an Athlon 64 X2 5000+. The 2GB of DDR2-800 and the PCIe 2.0 graphics slot are probably bottlenecks too. In short, I want to replace the motherboard, CPU, and RAM – I'll carry everything else over, at least for now. The parts I'm considering are shown below (the prices are from www.ebuyer.com).

- AMD A6-7400K (3.5GHz, dual-core): £46.98
- Gigabyte GA-F2A68HM-HD2 (FM2+, A68H): £38.99
- 4GB Kingston DDR3-1600: £15.99

Would this make a fairly up-to-date system that's likely to last two or three years before requiring further major upgrades? My main use is 1080p gaming. I'd probably add an extra 4GB of RAM after Christmas. Everyone tells me I should switch to Intel, but my budget's only about £100 and AMD offers more bang per buck.

Richard, Worcestershire

A similar query came up not so long ago on the Micro Mart forums – take a look at goo.gl/uaS8sg. I think you're mistaken that an Intel system would offer poorer value, Richard. The cost of your AMD-based setup comes in at £101.96. Now consider the following (with prices from the same source).

- Pentium G4400 (3.3GHz, dual-core): £45.98
- Asus H110M-A (LGA 1151, H110): £46.98
- 4GB Kingston HyperX Fury DDR4-2400: £21.47

The cost there is £114.43. Sure, this is slightly higher, but the parts I've chosen are only examples. The Asus board is a pretty close match for your Gigabyte: both are microATX and support HDMI, DVD, and VGA graphics outputs, 2 × USB 3.0, 4 × USB 2.0, a PCIe 3.0 graphics slot, gigabit LAN, 4 × SATA-3, and 7.1-channel audio. The chief difference is that the Gigabyte has a PCIe 2.0 ×1 slot and a PCI slot, whereas the Asus has two PCIe 2.0 ×1 slots.

You could shave off a tenner by choosing a board that takes DDR3, not DDR4, and by shoving in 4GB of DDR3. You'd not notice any compromise in performance, but why saddle yourself with end-of-line technology for the sake of a bit of loose change?

'X' Marks The Spot - Again

I service computers, and I've received a complaint from a customer about the login portal for Post Office Broadband (account.pobroadband.co.uk). In Chrome, the 'https' part is struck through with a red line, and the padlock has an 'X' on it. This doesn't happen in Internet Explorer, Firefox or Safari.

Looking into it, I've discovered that the site's security certificate uses the legacy SHA-1 encryption algorithm. Apparently the Post Office should be using SHA-2 (especially as it's free!). When I informed them of this, they weren't interested. Probably about half of their customers will be using Chrome, and it seems login passwords and account details could be at risk of being stolen. What are your views on this?

Tony Clack, TalkTalk

It's true that SHA-1 is now deemed insecure. Research undertaken by The SHAppening (goo.gl/CEMt07) suggests a successful attack would take around two months and would require 'only' \$75,000–\$120,000 of GPU time on EC2 (Amazon's cloud-computing rental service). Clearly this is beyond the means of a bedroom hacker, but it's well within the means of criminal organisations (as well as government intelligence agencies).

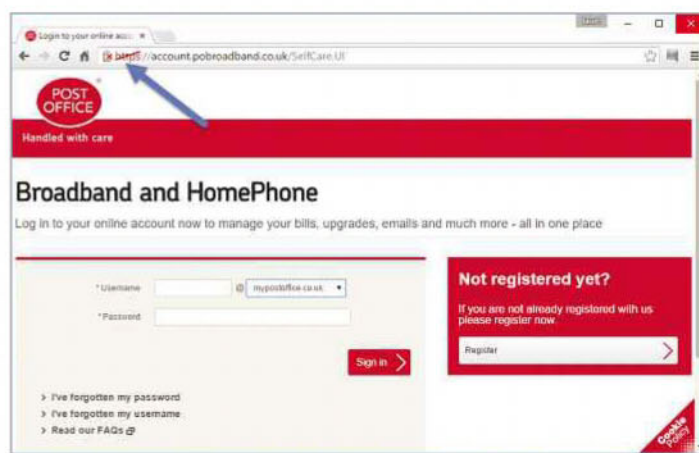
Chrome is ahead of the field in alerting users about websites that still have SHA-1 certificates. These sites are at equal risk in **all** browsers, but the others don't yet flag an alert. Firefox is due to follow Chrome's lead in January, and no doubt the remaining browsers will fall into line shortly after. The problem is that SHA-1 certificates are still being issued, and some aren't due to expire till 2020. My understanding is that as many as 25% of websites haven't yet switched to SHA-2.

I don't have any figures, but I doubt the Post Office's broadband division is much of a money spinner (unlike Royal Mail, the Post Office

is still a public body, so making a profit isn't necessarily the end goal). As such, I wouldn't think SHA-2 will arrive before the current certificate expires. That's on 18th April, 2017. As you point out, all the variants of SHA are free. However, it takes no little time and effort to make a website compliant with a new version, and time and effort aren't cheap.

To be fair, the risk presented by SHA-1 is small, and so far it's also only theoretical. I'm not convinced it's any great issue. You're quite right to raise the matter, though, Tony, and I thank you for writing in and highlighting that users should look out for potential problems flagged up by their browsers.

▼ Seeing this on a login page should be cause for concern, but exactly how much concern?



And talking of performance – wow! Cast your eyes over these benchmark results at AnandTech: goo.gl/40VQzx. They compare your A6-7400K to a Pentium G3258 (3.2GHz, dual-core, LGA 1150). And there's no contest. Across a suite of over ninety tests, the AMD chip wins only a handful, and in many of the others it's slaughtered. Utterly. Sometimes it's barely a third as fast as the Intel chip, and the G4400 mentioned above would pull ahead further still.

Where the A6-7400K wins convincingly is in games tests using the integrated Radeon R5. This is a good bit beefier than the HD Graphics 510 in the G4400 (though neither offering is sufficient for modern 1080p gaming). As you've already got a dedicated GeForce GTX 750 Ti, that's irrelevant, of course, but it could be a consideration for other buyers.

In my view, Richard, it makes no sense to go the AMD route. You'd save mere pennies and end up with a fraction of the performance. Sad to say, AMD hasn't been competitive, even on price, for some while. There are great expectations for the

Zen architecture – still a year away – but then there were great expectations for the Bulldozer architecture...

PS – An extra 4GB of RAM may not give the boost you hope. The main bottleneck in your upgraded system will be the hard drive, especially if it's as old as your current CPU. A

wise investment would be an SSD, one big enough for Windows and your core programs. You could then keep the hard drive just for data (where speed usually isn't vital). Around £34 would get you a 120GB model, and a 240GB model can be had for about £58.

▼ Dare we believe?

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AMD

“ZEN”

- ▲ Totally New High-performance Core Design
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- ▲ New High-Bandwidth, Low Latency Cache System
- ▲ Energy-efficient FinFET Design Scales from Client to Enterprise-class Products
- ▲ Availability in 2016

Crowdfunding Corner

Two very different, but very interesting, Kickstarter-based projects this week...

Tiny Arcade

Who doesn't love retro-gaming? No one, that's who! That's why we're sure that the Tiny Arcade is going to be a huge hit with gamers. The project takes the form of tiny, palm-sized video game cabinets which are fully playable, with full video and audio. Each cabinet features a full-colour OLED screen, SD card expansion slot, an analogue joystick with two buttons, a built-in speaker, a rechargeable lithium battery and a USB port for power and data transfer. The cabinets can be 3D-printed or assembled out of wood or acrylic plastic, and can be customised with supplied retro-style artwork (though you can create your own if you want!)

The games aren't strictly the ones you remember – they're open-source clones called things like *Tiny Invaders* and *Flappy Birdz* – but that does mean you can get a load of games free with your purchase. What's more, we're assured there are more to come thanks to a community of developers already working on new titles.

We can imagine this making a great gift for any retro gaming enthusiast. The cheapest version of the cabinet can be acquired, disassembled, by backing the \$60 (£39) tier. More money gets you the opportunity to have the unit assembled before shipping, and if you spend as much as \$150 (£100) you get a premium 3D printed cabinet. Units should be ready to ship in March 2016, so there's not long to wait. We think they're brilliant, so let's hope the project goes well.

URL: kck.st/1PPFiNn

Funding Ends: Friday, 18th December 2015

RemoteBoot

If you've ever found yourself cursing the fact that the computer you want to access over your network is switched off, RemoteBoot might be the thing you need. This remote management console allows you to physically turn a computer on or off using a web interface from anywhere on the Internet – even if you're not in your own home.

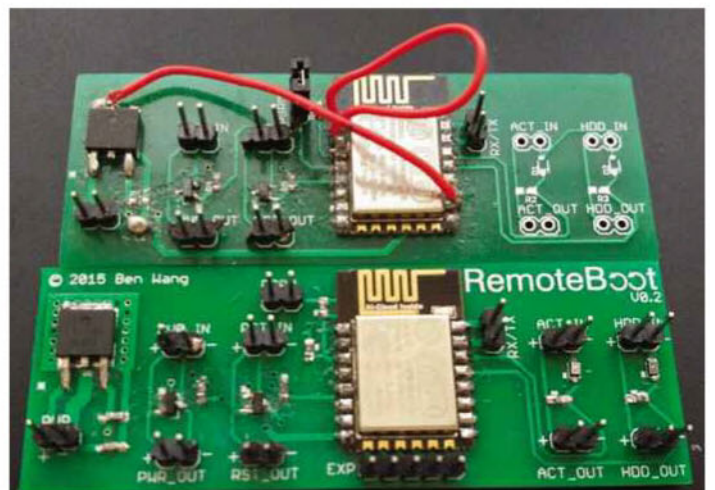
If you're wondering how this differs from Wake on LAN, it does so in several ways: it doesn't require motherboard support, it doesn't require specialised software, and it works even with wi-fi. There are no router changes required and support for all desktop computers should be available. It doesn't rely on special software, so you can even use it if the target PC has crashed or become unresponsive. As long as it has power, you're good to go ahead and try to get it going again.

It should be noted that the project is only offering the RemoteBoot circuit board, rather than a finished device, so it's probably not aimed at those without some working knowledge of computers. You will need to attach it to your motherboard and power switch, so if you're not confident doing that this may not be for you. But if you are, who could resist?

Just \$25 (£16) gets you a single unit and access to the cloud services being built to power it. Shipping is planned for April next year, assuming all goes to plan.

URL: kck.st/1j9wkxz

Funding Ends: Tuesday, 15th December 2015



Disclaimer: Images shown may be prototypes and Micro Mart does not formally endorse or guarantee any of the projects listed. Back them at your own risk!

App Of The Week

CyberGhost 5.5

David Hayward improves his online anonymity

Our online privacy has never been as more important as it is now. With various laws probably coming into enforcement over the coming months and years, with even more restrictions and government agency level 'observing' just around the corner, the situation is undoubtedly getting worse.

We've traded our privacy for pseudo-safety, a mock scare tactic created to pen us into an Orwellian society and state. Where does it end, and what can we do about it?

Pessimistically speaking, there's probably not much we can do. If the powers-that-be state that they're watching you, then they'll go about it regardless. That means we'll just have to live with it, but we can put a dampener on these restrictions and surveillance.

Become A Ghostie

CyberGhost is a VPN that we've used and supported for years. It's quite simply one of the best forms of online protection a user can possibly ask for, and it's just got a little bit better.

CyberGhost 5.5 has recently been released, and with it comes a number of additional benefits that can be added to your subscription package. Whereas simply hiding your IP address and encrypting your connection are

the norm for a VPN, the team at CyberGhost feel that there's more that needs to be done.

The new features added to the client interface include an ad-blocker, malware and virus protection, data compression, prevention of online tracking, the ability to force HTTPS, and access to even faster servers.

Advertising usually contains elements of location tracking and viewing where a user has been previously. Malware and virus protection is an absolute must these days, and while most users will already have some form of protection installed on their computers, having that protective layer at the online server side is a fantastic addition.

The data compression feature greatly improves mobile browsing speeds and data tariffs, and the prevention of online tracking will actively remove any content that could be seen as monitoring your browser usage. Finally, forcing HTTPS is a useful feature that many VPNs omit. By forcing a secure connection, you're increasing the security of your browsing and lessening the chances of your online banking, for example, being hijacked by some hacking method.

Beyond the new options, version 5.5 has a faster, slicker interface. Connection to the servers beyond the UK is quicker, and the overall download speeds are dramatically

Features At A Glance

- Easy to use, one-click connection to global servers.
- Safe and ad-free browsing.
- Malware and anti-virus protection at the server level.
- AES 256-bit encryption, anti-fingerprinting, unlimited bandwidth

improved. There's also a handy graph included, to show you how many instances of blocking, tracking and forcing of HTTPS have occurred during your use of CyberGhost.

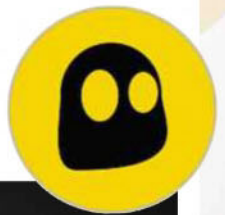
The Best Anonymity

CyberGhost keeps getting better, and it's the one VPN we can recommend without any hesitation.

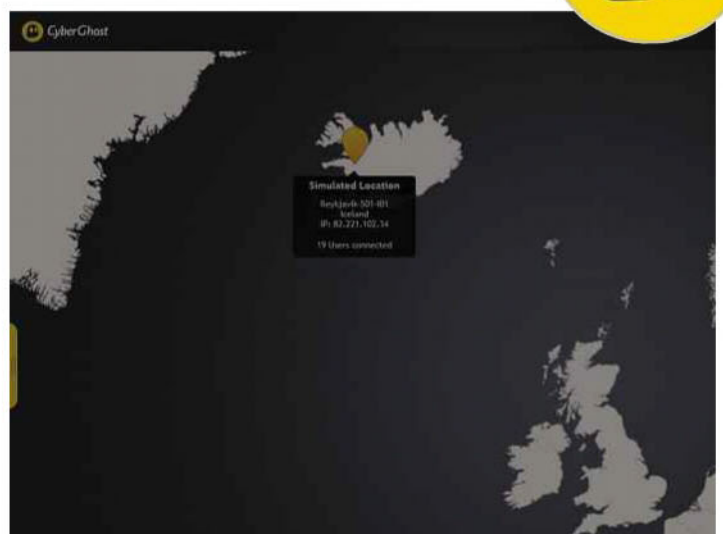
If you're serious about your privacy and you want to surf anonymously without being logged or watched, then CyberGhost has a subscription package for you.

For more information, including pricing for the various subscription packages, visit goo.gl/M5vwSJ.

➤ **CyberGhost keeps you safely anonymous**



▲ The extra features can be added to your subscription individually or as a group



▲ Connection to global servers is improved, with faster downloads

Logging Off

I know it's a snobbish form of intellectual elitism saying so, but are some political representatives in government mentally challenged or just selectively stupid?

If you hadn't already guessed, I'm talking about the Investigatory Powers Bill, which on my first exposure I concluded had been crafted by someone who lists the occupation on their resume as 'village idiot'.

Included in this wish-list for the hard of computing is the notion that encryption is allowed, but only if those who create the apps that use it store unencrypted versions of anything sent using it for those at GCHQ to wander through at will.

For that to be possible it assumes that there's a master unencrypting key or backdoor, making that encryption inherently insecure. Cybercriminals would be ecstatic if that happened, I'm sure.

If that wasn't moronic enough, they'd also like to shuffle through everyone's browsing history, or at least until we're all chipped with a means to read our thoughts directly.

What this makes me wonder is what civil liberties we have left that they're actually protecting? Because if they can read anything we write, listen to any call we make and do so without our knowledge or consent, then surely the idea of 'freedom' is a notional one that numerous people died defending some time ago?

And how will these amazing powers be kept in check, you may wonder. Well there will be a 'double lock' that requires both Theresa May and an as yet unnamed independent Judicial Commissioner to simultaneously agree before the data is made available.

The problem with this is that based on this work on the imagination, Theresa May could be convinced that pretty much anything was a threat, and there's no guarantee the second key holder won't be another political appointee. With great power comes the almost irresistible drive to abuse it and then swear everyone to secrecy.

And on that subject, if you discover that you've been hacked or the company you work for has, under this legislation you may not be able to tell anyone – because if it turns out that you've stumbled on the intelligence services going about their murky business a bit too obviously, then you'll be contacted and told you're now wearing the cone of silence.

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But hang on, what happens if this hack is breaking the law, hasn't been sanctioned by the 'double lock' rubbish and is in contravention of numerous treaties and provisions? Tough. You can't tell anyone, you can't complain, you can't go public, and those who decide otherwise don't collect £200, but do go directly to jail, where they'll probably be held without due process, indefinitely.

What worries me most about all this is not how massively overreaching it all is, but that those who cooked it up actually think that this will make us all safe. For starters, it won't make us secure from those in the security services who don't like rules, and it won't actually stop the people it's supposedly being brought in to catch.

What it might do is convince an entire generation to 'go dark' and not have anything to do with electronic systems.

Next you'll have the pre-crime division knocking on doors to ask why you don't have a mobile phone or broadband, as that will be considered highly suspicious activity.

Mark Pickavance

LAST WEEK'S CROSSWORD

Across: 7 April Fools Day, 8 Export, 9 Nuance, 10 Forsake, 12 Slide, 14 Tesco, 16 Outrage, 19 String, 20 Duster, 22 Antilogarithm.

Down: 1 Apex, 2 Widows, 3 Offtake, 4 Bound, 5 Assail, 6 Watchdog, 11 Overtone, 13 Sundial, 15 Crisis, 17 Russia, 18 Egg On, 21 Echo.

DISCLAIMER

The views expressed by contributors are not necessarily those of the publishers. Every care is taken to ensure that the contents of the magazine are accurate but the publishers cannot accept responsibility for errors. While reasonable care is taken when accepting advertisements, the publishers cannot accept any responsibility for any resulting unsatisfactory transactions. This week, apart from magazine production, has been dominated largely by *Fallout 4* (what else?). Apart from all the bugs, it really is quite marvellous. But rather than simply doing missions and progressing the story, we've spent a good portion of our playing time building a

massive house. At the time of writing, we've managed to get it up to four floors, but we have plans for more. Is there any advantage to these extra floors? No. Does it take ages to find all the materials to build them? Yes. So why are we doing it? We honestly have no idea. The important thing is we're having fun exploring this post-apocalyptic wasteland. And speaking of the apocalypse, we think the real thing might be arriving soon, judging by the storm that's currently whipping up outside our window. Apparently, it's something to do with a storm called Barney, which is a great name for anything, not just purple dinosaurs. In fact, we think we might have just found a name for our *Fallout 4* house.

THIS WEEK'S CROSSWORD

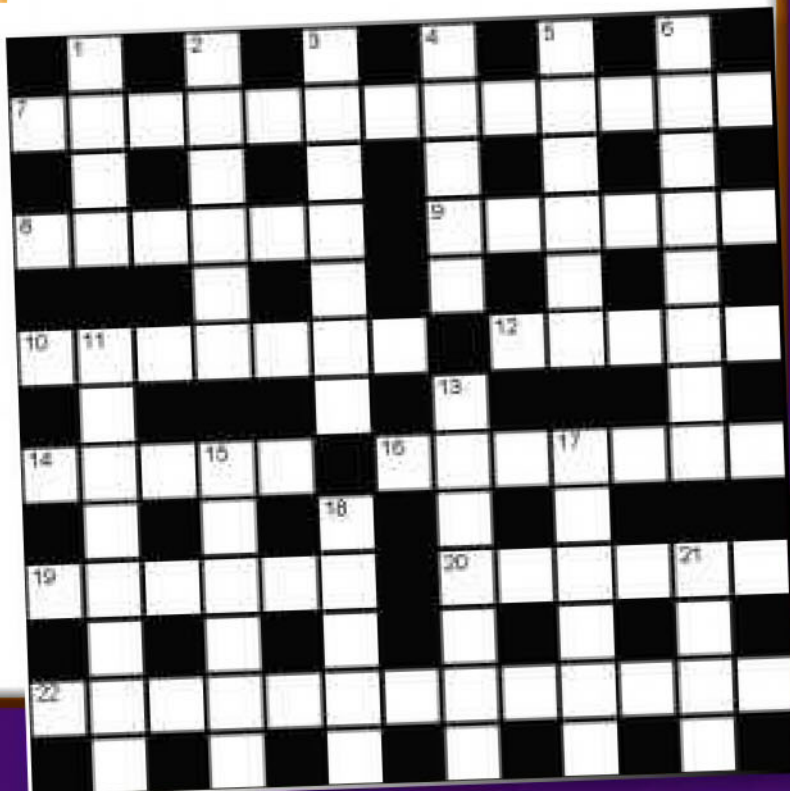
Across

- 7 Relating to the arrangement or accurate representation of the physical features of an area. (13)
8 A haphazard distribution in all directions. (6)
9 A refund of some fraction of the sum paid. Think EU or tax? (6)
10 The abode of Satan and the forces of evil. (7)
12 In SQL, this clause combines the results of two SQL queries into a single table of all matching rows. (5)
14 Unexpected problems affecting the timely completion of a project. (5)
16 Any of numerous extinct elephants widely distributed in the Pleistocene; extremely large with hairy coats and long upcurved tusks. (7)
19 .se TLD. (6)
20 A building or container that is larger inside than it appears to be from outside, or a time machine. (6)
22 Coin-operated gambling devices that produce random combinations of symbols on rotating dials. (5,8)

Down

- 1 Maintainers of the freely available source code for Android developers to distribute their own modified versions of the operating system. (Abbr) (4)

- 2 Period from 58 million to 40 million years ago. (6)
3 A submarine-launched ballistic missile system used by the United States and the United Kingdom. (7)
4 Electrical conduction through a gas in an applied electric field. (5)
5 The nickname for the Great Bell of the clock at the north end of the Palace of Westminster in London. (3,3)
6 A special diagnostic and engineering protocol that you can boot your Android device into. (8)
11 A nanostructure, with the diameter of the order of a nanometer. (8)
13 Popular term for the use of touch feedback to the end user of a mobile device. (7)
15 His law states that, given enough time, in any online discussion regardless of topic or scope, someone inevitably makes a comparison to Hitler and the Nazis. (6)
17 In machine learning, the distance between a decision boundary and a data point. (6)
18 A legendary creature resembling a tiny old man; lives in the depths of the earth and guards buried treasure. (5)
21 A unique code used to identify a particular mobile phone. (Abbr) (4)



Top 5

Jobs For Later

You know you'll have to do it at some point, but surely it can wait...

1 Backing Up

At any point, all the data on your PC could be lost without warning. Mechanical failure, power surges, flood, fire, asteroid strike: any of these things could wipe out years of photos, home videos and documents in seconds (although in the case of the asteroid, you're probably going to be more worried about it wiping out the human race). The answer, of course, is to back up. It's not a complicated idea: you keep extra copies of everything, separate to the ones you access every day. But how many of us actually bother? And even if we do, it's likely we don't do it half as often as we should, and even less probable that we keep our backups in a separate location (unless, of course, we're using cloud storage). So back up your stuff, people, just like we're going to do tomorrow. Or maybe the day after...

2 Clearing Out Old Emails

Anyone who had a GMail account when the service first launched might remember Google's promise that you'd never need to delete another email. Why? Because it gifted you a massive 1GB of free storage. Who could ever fill that, right? Well, as it turns out, pretty much everyone. This promise soon vanished, and the amount of free storage has crept up over the years, but if you're sending and receiving a lot of emails with attachments, you're still going to run out of space eventually. You could pay for an increased amount of storage, but if you don't want to dip your hand in your wallet, then you're going to have to delete some of your old emails. The problem is there are likely to be several thousand messages in your inbox, so it often ends up being a task that doesn't get carried out until you've pretty much completely run of space.

3 Full System Scan

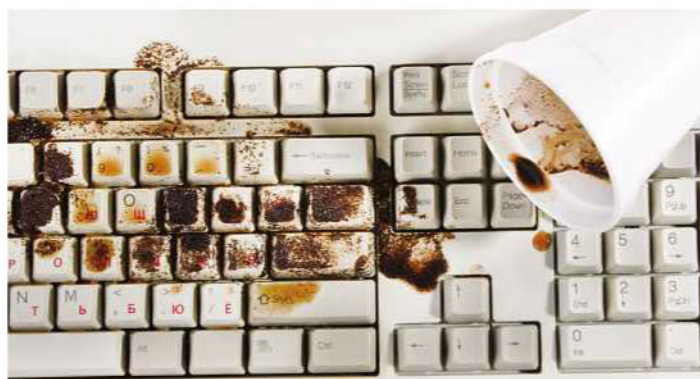
Thanks to the internet, it's never been easier to get viruses and other malware on your computer, so periodically checking to see if you're affected makes perfect sense. But it's also painfully slow and could make your PC unusable while it's going on. So while regular scans are advisable, the truth is most of will instead wait until we're experiencing slow PC performance or other aberrant system behaviour before we do anything. Of course, not all malware makes itself known, so this probably isn't a good idea. A better way of doing things would be to plan a time every week for a full scan, when you won't be using the computer for anything else. The problem, of course, is turning on your PC and resisting the urge to play *Football Manager* or *Fallout 4* all day instead.

4 Sorting Photos

Photos used to be precious things, because film developing could be expensive and you didn't know what you were going to get until you got the prints back. Nowadays, digital photography offers us instant results, and many of us end up with thousands of pictures on our hard drives, taken with dedicated cameras and smartphones. With so many files, it all gets a bit chaotic, so what you need to do is put everything in folders, sorted by year, event or something like that. It'll only take three, maybe four hours. So what are you waiting for? Oh, yes, that's right, it's a job for another time, and actually you don't mind scrolling through 25,000 thumbnails to find that one picture you're looking for.

5 Cleaning Your Keyboard

This perhaps isn't something that many people think they need to do, but they really should. Keyboards get remarkably grubby, with bits of skins, hair and often food getting between and under the keys. You can go years without noticing, but once you do, you'll find it difficult not to see it again every time you want to type something. Naturally, you'll want to do something about this, but you know it will involve taking every key off, running a damp cloth over everything, before putting the keys back where they were. Not hard work, but fiddly, so it's no wonder the most likely outcome is that you'll leave it and simply try to ignore the crunching sound of old biscuits when you press the spacebar.



Well, you've always wanted to learn to type with rubber gloves on anyway, right?

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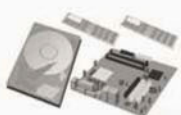
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